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AS TO CONTRACT CANCELLATION

THAT the worm has simply turned, and that offenders are being paid back in their own coin, is the defense offered in behalf of buyers who have been scored by sellers in the recent epidemic of cancellation orders. Producers, it is claimed, are but reaping as they have sown during the past few years and experiencing the inexorable penalty of taking undue advantage of buyers while the latter had but little recourse but to pay unreasonable prices, put up with all sorts of delays, scaling down of their orders, etc., or go without their goods.

In some quarters the impression prevails that the cancellation wave is simply a drastic corrective of a diseased commercial condition, the effect of which will be salutary to trade. Care will be taken to make contracts to stabilize rather than disturb trade. They will not be so one-sided. If sellers are to safeguard themselves, they must concede the right of buyers to do likewise; burdens must be balanced and responsibilities fairly shared. As commerce flourishes best when it ministers to the welfare of the greatest number, contracts should, if possible, have not merely a dual significance, but also a multiple one, in which regard would be given the interests of all, even though they may be but remotely concerned in such agreement.

RUBBER SHOE SALVAGE

WHEN the tire business of the United States was only $5,000,000 a year and the rubber shoe business was $27,000,000, tire repair was well under way, but rubber shoe repair had not even begun. Today with the tire business hitting the billion mark and the shoe business considerably bigger than ever before, shoe repair is just beginning to be an accomplished fact. The reason for the delay is due neither to apathy of rubber manufacturers nor waste on the part of the public. Worn out rubber shoes for years were the chief source of reclaimed rubber and had an instant and ready market. Scrapped tires, however, were a drug in the scrap market as they were difficult to reclaim. Had the cases been reversed, rubber boots and shoes repaired or remade would long ago have been as common as repaired or remade tires.

The low price of crude rubber, the vast progress in reclaiming tires and tubes, and to a degree the newly awakened thrift of American shoe wearers, all are responsible for the new rubber shoe salvage interest.

LIGHTER CARS AND MORE TIRES

AMERICANS can have lighter automobiles with a far higher gasoline mileage just as soon as they demand them, according to one of the most eminent authorities in the automobile industry, Colonel Jesse G. Vincent, retiring president of the Society of Automotive Engineers. He says that nothing deters manufacturers from producing such road-saving and economical cars but the insistence of Americans that cars shall be able to mount steep hills on high gear and to "pick up" swiftly on level roads. Gladly will the engineers do their part, he said, in revising their designs in order to get the utmost power out of every drop of gasoline; but the public must be reasonable and cooperate with such bodies as the S. A. E. This worthy organization has grown in ten years from 300 to 5,197 members and its activities are world-wide. In a nutshell, the aim of the Society is to make the automobile, and everything that pertains to it, 100 per cent efficient to its owner. Enterprising rubber manufacturers now vie with one another to produce tires that will measure up to the high standards set by the S. A. E.

The retiring president also confirms the claim made by leaders in the rubber industry that the passenger automobile has long ceased to be a luxury, and he cites statistics showing that 90 per cent of all passenger cars are used more or less for business, over two-thirds of the mileage being for that purpose. Equally interesting is the statement of Colonel Vincent that the average owner of a motor car through its use increases his earning

power 57 per cent. To the farmer the motor car has been a decided boon. By replacing men with machines, in most of which rubber must be used, the American farmer produces four times as much food per human unit as the European, and realizes relatively that much more in profits.

RUBBER ROSES IN SIGHT

THAT the rubber bloom of the future will not be the "excess sulphur" of the present, but a bloom that will rival in beauty the fairest garden product, was foreshadowed recently at a banquet, where side by side with choice cut flowers were dainty bouquets made of rubber that could scarcely be distinguished from their natural models.

Some may ask, "Why, then, are they not marketed?" The answer is, that the market has not yet "arrived." It may be even several years before woman will be educated to adorn her millinery with rubber roses, but when the time comes the far-sighted manufacturers will be found ready to meet the demand. Yet this is but one of many instances of the vision shown by the practical prophets of the rubber industry. There is even reason to believe that through the ceaseless experimenting in the great rubber laboratories many novel and important uses for rubber will soon be found that will go part of the way toward answering the question, "What shall become of the enormous output of the growing plantations in the Far East?"

MAKING MACHINERY DO IT

THE favorite contention of the radical agitator is that the sole concern employers have for their workers is to force them, in utter disregard of their health, comfort, future, etc., to produce the maximum output at the minimum cost in order to swell extortionate profits—the agitators always like to picture as excessive even moderate returns on capital. Yet the truth is that the humane, considerate, enlightened employer is far from being a rarity nowadays. Indeed, many of the great captains of industry are keener students of social conditions and are striving more actively and intelligently to promote the welfare of workers than the men who thrive only by fomenting labor unrest. Hard workers themselves, many of them through real merit rising from the lowest rung of the ladder, such industrial leaders well appreciate the view-point of the toilers and they are making a constant, practical effort to lighten the lot of labor. Nor is such effort less earnest because it may not quite coincide with the radical and impractical changes hurriedly urged by the professional trouble-breeder. It is gratifying to note, too, that many of such real leaders of labor, whose counsel is much sought and whose methods are widely emulated, rank as high executives in the rubber industry.

Advanced thinkers discard the old notion that labor is but a mere commodity to be bought in the cheapest market to produce goods to be sold in the dearest. They also challenge the claim that modern machinery has reduced workers and shirkers to one dead level, killed personality, and made each operative but a mere automaton. In refutation, they cite the fact that since the introduction of modern labor-saving machinery the worker earns more and works less, his strength is not overtaxed, his chances of promotion are as good as ever, he has infinitely more sanitary and comfortable working conditions, and has far more time for pleasure or self-improvement. Of especial benefit to him is the practice nowadays, and very generally in the rubber industry, to speed up the labor-saving apparatus rather than the man and thus avert undue strain on the latter. "Sweat the machine, not the operator," is the modern shop slogan.

Industrial managers are finding out also that with shorter shifts for the men and longer shifts for the machines, output can be actually increased, and that workers do react favorably to efficient, drudgery-saving devices.

Their factory clinics tell them, too, that most of the accidents to workers on long shifts occur shortly before quitting time, when caution relaxes with ebbing energy.

BUILDING MEN TO BUILD RUBBER GOODS

A NEW DEPARTURE in the rubber industry, that will doubtless be emulated by many other branches of trade, and which has already proved very helpful, is the training of foremen in executive work, assuming responsibility, and developing energy, talent, and possibilities of the men in their departments. At industrial schools in big shop plants as many as fifteen courses of study are pursued, taking in the sources of crude rubber, the problem of labor turnover, the viewpoint of the operative, the question of utmost efficiency, the getting of supplies, time and rate fixing, etc. Foremen are urged to raise not only their own ideals and standards, but to also develop manhood and character, with skill and speed, in those committed to their charge. In other words, they are being educated to build the men who build the tires, belting, shoes, and so on. For foremen in smaller industries an excellent correspondence course is provided.

IT WAS A GENEROUS AND FAR-SIGHTED ACT ON THE PART of Frederic C. Hood to step into the breach and rescue the Boston Belting Co. from the morass of mismanagement into which it had fallen. As a posthumous favor to James Bennett Forsyth, to whom the pioneer American company was dearer than life, it is unexcelled.

IT IS WELL FOR TIRE USERS THAT THERE ARE NO "SPEED cops" in factories to check the swiftness of examinations, else how could they, with the present high cost of labor, ever hope to pay for the "over 600 rigid inspections" one tire-making concern says it gives every casing?

Repairing Rubber Footwear[1]

A New and Fast Growing Industry

Early Methods—Metal Plate Repairs—The Chain Matrix—The Fabric Matrix—An English Sole Clamp—Miller's Tennis Sole Press—Repairo Mender—Rubber Shoes Recalled from the Junk Pile—Faults in Footwear—Overseas Boot Repair—Up-to-Date Boot Sole Repair Methods—Processes of Drying, Preparing, Cementing—Mold Making—Sole Stocks and How Applied—Curing—Boot Heel Repair—Mending Uppers—Repairing Tennis Shoes—Tools and Equipment Needed—Vulcanizing Machines in General—The Arthur Apparatus—Rubber Footwear Patching and Curing Forms—Method of Using Half-Soling Forms—The Miller Machine—The M. & E. System—The Brackett Vulcanizer—Cements for Repair Work—Patented Machines for Rubber Footwear Repair.

EARLY METHODS

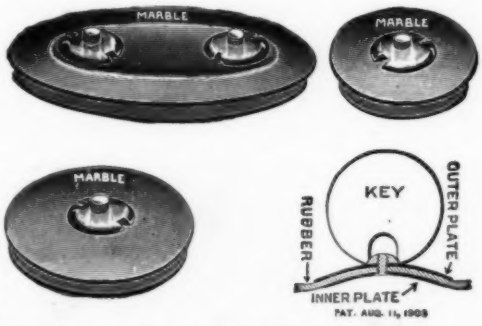
WHILE tire repairing began almost with the birth of the pneumatic tire, the repair of rubber footwear has been, up to a comparatively recent date, of a sporadic nature. The manufacturers have never attempted the repair of rubber footwear. Damaged goods were either sold as "punched" (seconds) or scrapped. Attempts have always been made by thrifty people at home to fix tears in rubber footwear with rubber patches stuck on with rubber cement, but such work has been neither considerable nor lasting.

Occasionally a thrifty cobbler added a can of rubber cement to his kit and crudely affixed pieces of sheet rubber over tears or holes in rubber shoes or sewed soles and patches on rubber boots, but the volume of work was small at best.

METAL PLATE REPAIRS

One of the early rubber boot menders was a double clamp of metal that, while it was not elegant, served to stop leaks in rubber boots. It was called the "Easy Quick" repairer. It consisted of two concave plates arranged to fasten together. One plate was placed within the boot with one or more threaded studs passing through the torn portion. A second plate on the outside, through which the stud passed, was clamped tightly to the first by means of a small nut. The plates were very thin and the mender was easily applied and worked well.

A real attempt at workmanlike repairing came when a noted sporting goods house arranged to resole and overhaul its tennis and other athletic shoes. Following this, expert repairmen in France during the late war took up the problem of mending



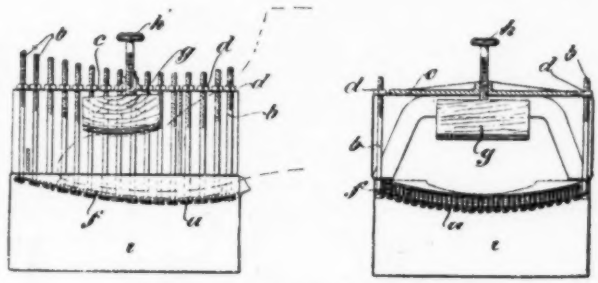
RUBBER BOOT MENDER

trench boots and did a lot of it and very well. Not only did the French take hold of the problem, but other Europeans also did some good work in this line.

A German invention, for example, was this:

THE CHAIN MATRIX

A flexible metal surface composed of a series of fine chains placed side by side, was employed as a matrix for the sole. The apparatus is shown in the illustration, that on the left being a longitudinal section, and that on the right a cross section. In use, the repaired sole on a last is placed under the pressure block *g*,

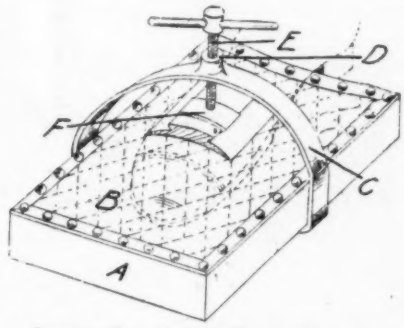


GERMAN SOLE CLAMP—CHAIN MATRIX

the sole resting on a strip of gauze packing which is placed on the mat of chains. The screws *b*, one for each chain, are then tightened and adjusted, drawing the chains tight against the sole. The chamber *i* is then heated by a gas burner, by electricity or by steam, and the vulcanization effected.

THE FABRIC MATRIX

Another German invention, also taken out during the war, is for attaching soles that are vulcanized either by self-vulcanizing solution, or in dry heat after affixing. The press is simply a frame *A*, on which a strong, flexible web *B* is stretched. A curved metal band *C*, threaded at *D*, holds a screw *E*. This screw raises or lowers the press plate *F*.



GERMAN SOLE PRESS—FABRIC MATRIX

ENGLISH SOLE CLAMP

An English invention that is simple and quick in its work is used in applying rubber soles to footwear of all kinds. It was designed primarily for composition soles. It is really an adjustable clamp fitted with welt grips and adjustable thumb-screws. In use, the sole is cemented, put in place, the clamps applied, and the job left until adhesion is complete. Of course a cold cure or a self-vulcanizing cement would be necessary in many cases.

MILLER TENNIS SOLE PRESS

A special American apparatus used in making and repairing tennis shoes is Miller's press. The sole and foxing is molded to the canvas and vulcanized while under pressure.

Referring to the drawing, which shows two views of the device: *A* is a table upon which rests a steam chest *B* provided with steam pipes *C* and *D*. Connected with the table by rods *E*, is a yoke *F* into which are threaded clamping screws *G* and *H*. These screws are raised or lowered by hand wheels *I* and *J*. Resting on the steam chest are molds *K* and *L*, each made in one

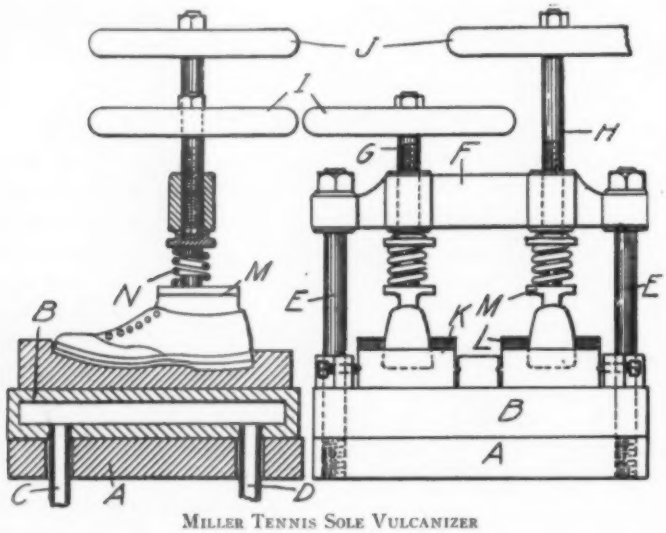
[1] Copyrighted by Henry C. Pearson.

piece and constructed with the exact contour of the sole. *M* is the last over which the shoe is made. Between the last and the pressure screws are the steel springs *N* by means of which a flexible pressure is obtained to compensate for the settling of the last as the plastic rubber sole is forced into shape. The molds are made deep enough to bring the edges of the soles up around the foxing and to force the edges of the sole into the fabric of the upper. For repair work the raised edges on the sole molds are not necessary.

"REPAIRO" MENDER

An alert American supply house has recently put upon the market a patching outfit for rubber shoes and boots called "Repairo." This consists of a prepared rubber patching material and a bottle of self-vulcanizing cement. In using, the surface is roughened, the cement brushed on, the patch applied, and the repair is accomplished.

Most of the foregoing are, of course, designed for individual use and will have a limited market. It is because the great



MILLER TENNIS SOLE VULCANIZER

waste in rubber footwear has caught the attention of the tire repairmen that a new industry has begun to develop rapidly. In numerous well-equipped vulcanizing plants special apparatus has been installed for rubber footwear repairing, keeping the plant profitably busy during the usually dull winter season.

RUBBER SHOES RECALLED FROM THE JUNK PILE

Until quite lately worn rubber boots, arctics and tennis shoes were sold to junkmen for a trifle. Now their owners are sending them by the hundreds to the salvaging shops, from which they come back practically as good as new, and yet at but a fraction of the cost of new. Tire stock, old and new, is largely used in such shops and many customers declare that soles made of such material last even twice as long as the regulation boot soles. Heels, counters, and toes, if worn or cracked, can be mended, and worn places or tears on uppers or legs neatly patched. Repairmen claim that over 25 per cent of the footwear found in the junk piles is well worth repairing. Hence, there has been found in the mountains of old boots and shoes in the yards and storehouses of the reclaimers of old rubber a hitherto undreamed-of source of profit.

FAULTS IN FOOTWEAR

In by far the greater number of cases, rubber boots and shoes are damaged through hard usage, and the blame, of course, attaches to the wearers. In a small degree defective manufacture is the cause of shoe troubles starting. Many people want cheap shoes, and manufacturers try to meet such demand by turning out a low-cost product which they frankly tell buyers cannot be guaranteed. Hence it is that dealers rarely have trouble with first-grade goods but some find it necessary, in order to hold trade, to make a slight proportion of replacements (figured at about ⅓ of 1 per cent) on third-grade goods.

"REPAIRO" MENDING PATCH

The trouble that develops often occurs on the uppers, and generally where two or more layers overlap, but the commoner fault is found in the separation of the soles from the uppers about the place in which sits the base of the great toe.

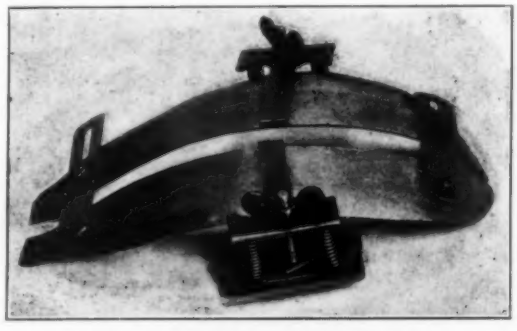
Tennis shoes give way much sooner in the soles than boots. Rough wear on coarse soil explains this largely. A similar type used only at the seashore is more short-lived than those worn on the soft soil and sandless sidewalks of inland places. The soles are literally ground down by frequent contact with the sharp sand on the beaches, and by abrasion on the sandy board and cement walks.

OVERSEAS BOOT REPAIR

The beginning of rubber boot repair in army circles, according to rumor, was this: A short, snappy captain brought his rubber boots to a grouchy shoe repairer and ordered new soles and heels. The repair man objected that he had no boot stock, and was curtly told to build a good thick sole of "tire tread." For a joke on "Shorty" the repair man attached a sole and heel five inches thick cut from a discarded solid tire. The captain, a thoroughbred, never turned a hair when he viewed the boots. Indeed, he was most complimentary, convincing the repairer that if a five-inch sole could be made to stick, a quarter-inch sole would certainly stick better. Furthermore, the repairer was at once put in charge of boot work and scored a great success.

UP-TO-DATE BOOT SOLE REPAIR METHODS

When it is recalled that all the tools and vulcanizers in the repair department were for tire repair, it will be seen that considerable ingenuity was required to effect repairs on boots and arctics. It was not long, however, before metal blocks were cast to fit into tread cavities, the tops of the blocks being sole or heel molds. Although the cure was a bit slow, the effect was good. The leather repairers were also



ENGLISH ADJUSTABLE METAL SOLE CLAMP

helpful in sewing on cemented patches and soles until proper vulcanizing equipment was finally secured. Heels were cemented and then nailed on.

Along with the design of special machinery came processes for repairing the defects in footwear caused by accident or wear.

PROCESSES OF DRYING, PREPARING AND CEMENTING

The process of repair in a well-equipped rubber repair shop is as follows:

A boot or shoe is first carefully examined to see if a repair can be made successfully. Considerable judgment is required, for a faulty repair drives customers away. Granted that the article is acceptable the first step in the work is thorough drying.

2,000,000 POUNDS OF RUBBER SHOE JUNK; 500,000 POUNDS COULD BE REPAIRED

When rubber footwear repair becomes a fully established industry vacuum dryers will probably be employed. At present, however, many simple expedients are resorted to. One of the best is a hollow heated form similar to those used in hosiery mills, over which the article is drawn, and which soon expels all moisture. Use is also made of compressed air or a blast from a small electric blower. Drying is very important, for not only will cement refuse to stick to damp rubber or frictioned fabric but blisters form during the cure, from imprisoned moisture, and the repaired section is just so much weakened.

The boot, thoroughly dried, is put upon a "jack," such as leather cobblers use, and the worn parts cut away down to the solid surface of tread, or to the cloth and rubber underlay. All dirt is brushed out with a stiff wire brush. To get a good surface for cement adhesion, the sole part is roughened thoroughly with a rasp or a revolving wire brush. The whole of the part to be patched is then coated with a rubber cement containing sulphur; in other words, a vulcanizing cement. The boot is then put aside until the solvent in the cement has fully evaporated. This is done three times; not that the surface needs so many coats, but to allow some of the cement to penetrate to the rag filler and the friction and thereby give them additional strength.

MOLD MAKING

The next step is the preparation of a mold for the new sole. Stock molds for this purpose are made by mold makers in the rubber centers in any style called for. They are of iron or steel and engraved for any sort of corrugation. Some repairers have turned to a lead mold which they make themselves. The process is very simple. A sheet of lead plate ¼-inch in thickness, slightly wider than the boot to be repaired is taken, and the middle of it marked to show where the corrugations should appear. It is then scored with a cold chisel, or a flat, suitably-engraved steel punch 1½ inches square with a series of criss-cross channels not unlike the tread of a new rubber shoe. The edges are then turned up, either about a wooden form or about the sole of the shoe itself, and a shallow lead mold is the result. The mold is warmed, the surface painted with a thin soft soap solution and when dried it is ready for use.

SOLE STOCKS AND HOW APPLIED

Unvulcanized stock for sole repair is of two distinct sorts: That which may come from the rubber shoe manufacturer and which is already of the proper thickness and, indeed, has the corrugated tread from the soling calender; and tire tread stock. The latter is more available in that every accessory house carries it. If tire tread stock is to be used the *modus operandi* is this:

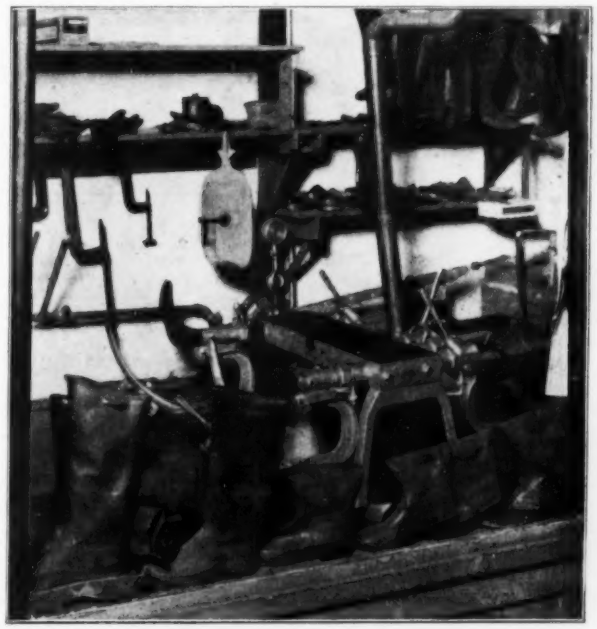
Two pieces are cut from 1/16-inch tread stock, so as to get a ⅛-inch thickness. If, after being rolled into one solid sheet, air blisters develop, they are punctured by a sharp awl. The doubled sheet is then cemented on one side and thoroughly dried. When this is done, the boot is placed upside down on the jack, the new sole applied and rolled on hard with a hand-roller. Where the edges come, a stitcher is run to help the adhesion in parts which the roller cannot touch. The lead mold is then put upon the sole and tied in place with broad tapes.

CURING

It is now ready for the vulcanizer. This is a chest through which the steam circulates. The boot is put upon the hot-plate and kept there until vulcanized. The steam pressure is from 40 to 60 pounds, according to the grade of rubber used. At 40 pounds pressure the temperature is 288 degrees F., quite sufficient for curing average stock. Finer qualities require higher temperature. The average time for curing is an hour and a half. A frequent tightening up of the clamps during the process aids in evening up low spots.

BOOT HEEL REPAIR

The repairing of the heels of rubber boots is very similar to that of sole repair. If only the heel is to be repaired, it is customary to slip an asbestos or other fabric protector over the foot portion of the hollow last. This prevents the heat from affecting the sole and upper during the cure. The methods described are admirably adapted for the tread section of all sorts of heavy rubber footwear, including fishermen's and lumbermen's overshoes and men's and women's arctics.



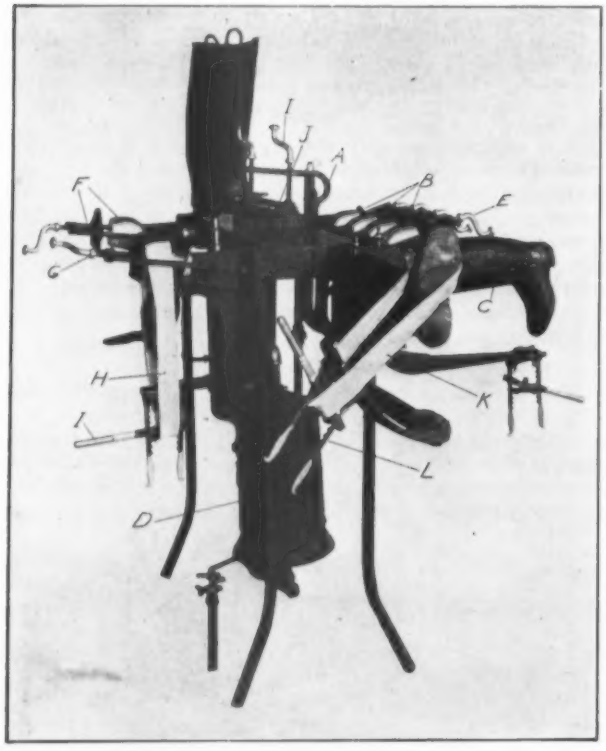
SHOE REPAIR UNIT IN TIRE REPAIR SHOP

MENDING UPPERS

For mending a tear or a worn spot in the leg or upper of a rubber boot the process is as follows:

The portion of the surface surrounding the tear is rubbed with any abrasive substance that will remove the varnish. The rough-

ened surface is then covered with vulcanizing cement, and a patch cut the proper size, one side of which has been cemented and dried, is applied to the prepared surface. This is rolled down hard. The edges of the patch which should have been skived thin are set with the stitcher. The repaired portion is then put between the platens of a small plate vulcanizer. If the repairer has no plate vulcanizer, small patches may be cured by placing the freshly repaired portion against the hollow steam-heated last



THE ARTHUR REPAIR VULCANIZER

of the foot vulcanizer, tying with broad tape and fitting the clamps to hold it firmly in place.

REPAIRING TENNIS SHOES

A salesman in the tennis shoe department of a large sporting goods store in a western city, being asked by the writer if repairs could be made on the soles of old shoes, stated that the factory from which the shoes came would readily do any needed mending. "How do the makers fix a big hole in a sole?" he was asked. "Very easily," he replied. "They just get a wad of soft rubber, press it into the hole, and simply solder it in place." But the fact remains that rubber shoe repairing is not yet quite as simple as the work of a tinker.

The best method of repairing tennis shoes is by the cure already described. Experts claim to be able to repair any sort of rubber wear by this process from "Keds" to baptismal pants.

Cloth-surfaced footwear, such as cloth-topped arctics, wading stockings, etc., are quite as easy to repair. The fabric about the worn or torn place, after being well cleaned, is given several thin coats of cement, each being allowed to dry well. The solvent carries the rubber into the fibers of the cloth and prevents water from entering by capillary attraction. A rubber patch is prepared in the usual way and affixed by rolling down and vulcanizing, as in the case of the rubber-surfaced boot leg.

TOOLS AND EQUIPMENT

The tools needed are few in number, that is, for a small plant. They comprise a vulcanizer, zinc-covered work bench, rack or cabinet for raw stock, shoemaker's jack, and covered scrap bins for both vulcanized and unvulcanized scrap. The hand tools are at least two knives; a heavy skiver and a pointed cutting knife, machinist's hammer, covered cement can, cement brushes, naphtha can, roller, stitcher, wire brush, rasp and awl. To this might be added experience in rubber work, patience and ingenuity.

VULCANIZING MACHINES IN GENERAL

Repairs on rubber footwear are cured on or in vulcanizers that are heated by gas, oil or electricity. The gas or oil may heat the vulcanizing plates directly or may be used in forming steam which heats the vulcanizing platens. Electric vulcanizers heat the plates directly. The open steam cure is not easily adaptable to footwear repair, nor is the dry heat cure, that is, the exposure to heated air in a closed chamber.

The time for cure varies widely, very thin patches calling for, say, a 20-minute cure, and thick ones as much as an hour and a half. This further depends upon the type of compound used, the proportion of sulphur, and the degree of heat employed.

Complete vulcanizing equipment will range in price from $100 for an outfit well suited for any small repair shop to $450 for apparatus with which not only every form of rubber footwear repairing can be done, but also many kinds of tire and tube repairing, with the utmost dispatch and efficiency.

THE ARTHUR APPARATUS

Of the various makes of machines for repairing rubber footwear, one of the most complete is the Arthur footwear vulcanizer. This apparatus generates its own steam, is suited for even a large repair shop, and not only can half-soles and full or half-heels of any size rubber boot or shoe be cured with it, but a tire repair man can also use it for mending inner tubes and other rubber goods.

The outfit has a steam table or hot plate 10 by 31 inches for flat vulcanizing work, mounted on cast-iron legs. From the table project eight hollow boot and shoe forms, with a similar number of brackets projecting from the forms and attached to the under side of the latter; eight jacks are fastened to the bottoms of the brackets. Eight canvas belts are supplied to be placed over the footwear being repaired, and which can be tightened by the jacks so as to give adequate pressure on the gum during the curing. Other features are: a water tank with gage attached; a steam gage; a pop valve; a heater with gas or gasoline burner; a follower plate with clamp for short forms, and two follower plates and clamps for long heeling forms; two pairs of foot forms with overhead frame and clamp for half soling, the bottoms of the shoe forms being flattened to fit on steam table, four pairs of sole lasts, and three pairs of heel lasts; two 6-inch C clamps, six sets of foot leads, and six sets of knurled-inside ⅛-inch heel leads. With the outfit is also supplied a quantity of this 1/16-inch lead for covering patching jobs and a moderate amount of supplies for trial jobs. The machine weighs about 700 pounds, has a length of 64 inches, and a width, with brackets extended, of 87 inches.

A smaller outfit, but which nevertheless provides an excellent equipment for shops having only a moderate amount of repair work, is known as the "Baby" footwear vulcanizer. It has about half the capacity of the vulcanizer just described. The same maker also produces a large and a small combined footwear and tire vulcanizing outfit.

RUBBER FOOTWEAR PATCHING AND CURING FORMS

The forms shown in the illustrations and numbered from 1 to 6, inclusive, are all hollow to receive steam used in curing.

1. A short form used for mending the rear part of a heel on light rubbers with hollow heels as well as top lifts. A follower plate and clamp press the end, and a bracket and jack below aid in tightening a canvas band pressing the top surface.

2. Form adapted to the shape of the back of a boot to facilitate patching that section. Pressure is obtained by a canvas band

drawn tight with a bracket and jack operated by hand.

3. Form used for vulcanizing full heels on boots and for vulcanizing pieces on boot legs. Pressure against the end is obtained with a follower plate and a clamp, and a pressure on the top surface with a canvas band drawn taut with a bracket and jack.

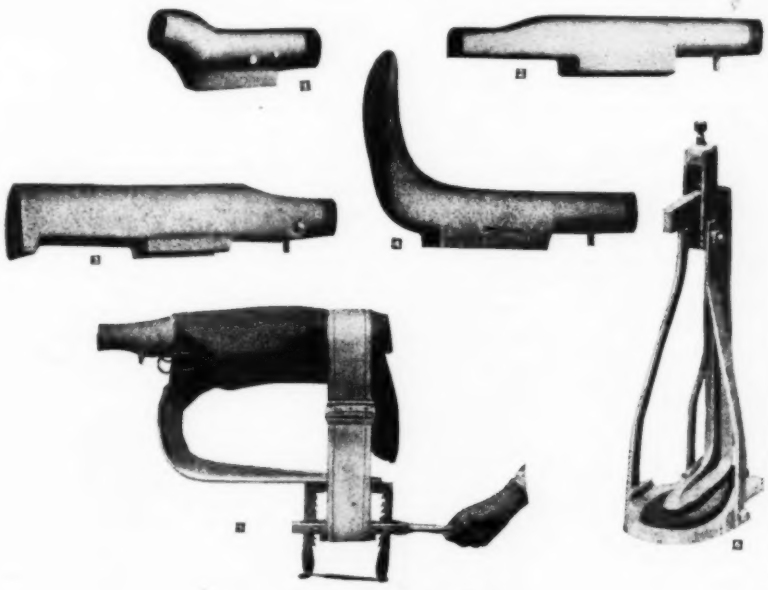
4. Upturned form used for repairing the toe and sides of boots and rubbers; a swinging bracket and jack gripping a canvas band apply pressure wherever desired.

5. Mode of producing pressure on a repair job by means of a bracket, jack and a canvas band.

6. Half-soling form to be set on a steam table showing a foot form on which the boot fitted with a bendable lead mold for the sole, is set for curing. The loose clamp is put into the boot, its lower end being made to fit into the slotted guide of the last; the frame supports the foot form, clamp, and the screw above by means of which pressure is applied for vulcanizing the half sole to the boot.

METHOD OF USING HALF-SOLING FORMS

The mode of using the half-soling forms is more fully explained in the following description: The gum tread prepared for the half sole is set in the flexible lead mold, after the latter has been closely shaped and upturned about the old sole. The boot so fitted with the gum and the lead mold is then set on the foot form and the proper size last placed inside the boot. Then the loose clamp is inserted in the boot and its lower end fitted into the slotted guide of the last. The upper end of the clamp fits into a slot in the upper part of the frame, and needed compression for curing is obtained by tightening the screw on top. The repair job is then left on the steam vulcanizing table, the time for curing ranging from 40 minutes to an hour, according to the degree of heat used, the quality of the gum tread, and the thickness of the sole.

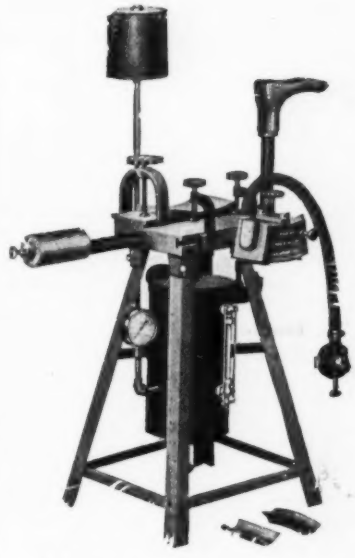


FOOTWEAR CURING FORMS

THE MILLER MACHINE

A very efficient vulcanizing apparatus for the average footwear repair shop is the Miller repair vulcanizer designed for attaching to a steam line. It is equipped with a gas burner to generate its own steam, or with a force-feed gasoline burner for steaming. This outfit, capable of making all the usual repairs on any boot or shoe, consists of a hot-plate or steam table, 30 by 7¼ inches, set on cast-iron legs and having side flanges which grip two wish-bone clamping devices set above the hot-plate and used in the half-soling process. Pressure for curing a sole repair is given the auxiliary clamp, which fits inside the boot or shoe placed on the hot plate, by turning a wheel somewhat like that used on a copying press and which is set in the top of the wish-bone clamp. From one side of the steam table project two inside hollow boot molds, one large and one small, with two revolving arms and extensions, and four sets of double thumb screw pressure clamps with which to tighten tapes on footwear placed on the boot molds. For the half-soling work the outfit also provides seven pairs of suitably indented sole plates in sizes assorted from 3 to 14, with seven pairs of inside sole lasts to work with the sole plates, and three different sizes of heel molds.

Other Miller apparatus are inside boot vulcanizers to be attached directly to a steam line, the equipment including a revolving arm with extension, double thumb screw pressure clamps, and wall tee fitting for affixing to wall or post. Half-sole and heeling equipment can also be had separately to be used with any hot-plate used by inner tube repair men. This outfit usually includes large clamps, auxiliary sole clamps, heel molds, button sole plates with high side walls, and inside sole lasts to work with the plates and in sizes ranging from 3 to 14.



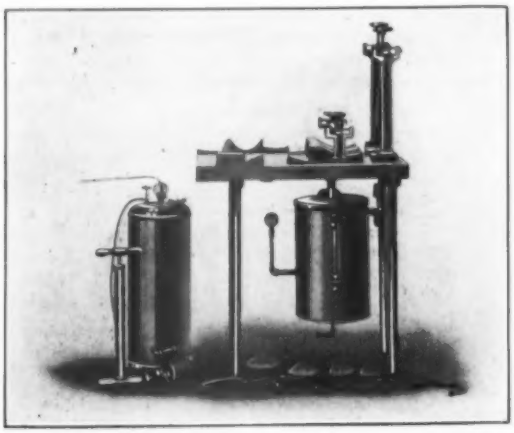
THE MILLER REPAIR VULCANIZER

THE M & E SYSTEM

The M. & E. system is quite simple and very compact. It consists in brief of a steam table upon the top platen of which are built a variety of special molds adapted for all boot and shoe repairs.

The steam table consists of a series of molds on the hot plate, the size of which is 32 by 17 inches. The molds are designed to conform to the different shapes taken by the various angles of a boot or shoe, permitting the repair to be made, no matter where the rip, tear or worn out spot may be. The vulcanizing is done on the outside, as no boot lasts or other inside contrivances are used. It is claimed that this outfit will resole, reheel and put patches on the edges, sides, back of the heel, or instep. In addition, it will repair hot-water bottles, hospital sheets, rubber gloves, tennis shoes, rubber coats, football bladders, inner tubes; in other words, any sort of a rubber article.

The illustration shows the device complete with vulcanizing table mounted on strong legs and the steam boiler in place. The gasoline force-feed burner is ready to be attached to the boiler. The gasoline supply tank is equipped with gage, hand pump and necessary connecting hose. The boiler can be arranged to use



THE M. & E. REPAIR VULCANIZER

gas, or, wherever steam is available, the vulcanizer is sold without the boiler.

From 60 to 65 pounds of steam are required for vulcanizing. The average job requires from 15 to 20 minutes. Seven to fourteen jobs can be accommodated on the table at the same time.

THE BRACKETT VULCANIZER

The Brackett machine is designed with a view toward simplicity in all its parts, as in some instances it will be operated by workmen who have not had a great deal of experience in this line of work.

The base of the machine is cast in block, of high-grade iron, with capacious steam chambers. Ample steam connections are provided and conveniently located, as this outfit is made to connect to any steam vulcanizing plant, thus saving the cost of an extra boiler. However, steam heaters can be furnished.

With this method of construction a direct cure on the spot to be repaired is made. No outside cures whatever are used. The means of securing the proper pressure is unique in its simplicity, using any granular substance, preferably rye, for the inside pressure and direct adjustable clamps for the outside pressure. This allows the work to be held rigidly in the proper position to obtain a first class job of vulcanizing.

Four toe clips of special design are furnished with the outfit which handles all sizes of work. Installation is made by placing the machine on a bench and connecting to the steam plant with a steam hose.

The "Baby" Brackett vulcanizer does the same work as the larger type but requires more time. The molds are preheated and the vulcanizing is done on a steam or electricity heated tube-plate.

CEMENTS FOR REPAIR WORK

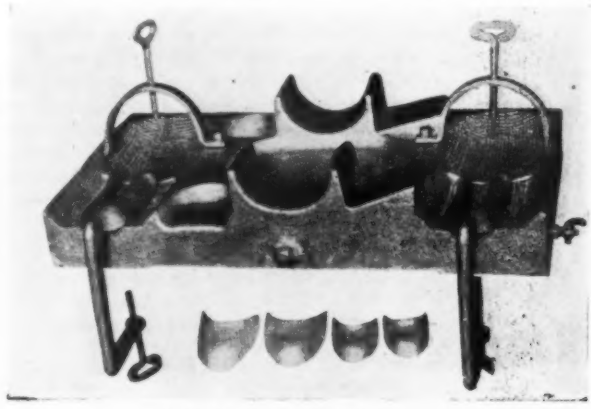
Cements for footwear repair are of various sorts.

First is the well-known rubber cement which leather shoe cobblers use. This is made of rubber dissolved in naphtha and may or may not contain a little resin to make it more adhesive. It is used in part for its adhesive qualities, but also because it renders goods waterproof. The cobbler always depends upon stitching or pegging to hold a sole in place, and not upon this cement.

Second, is the self-vulcanizing cement. This is of compounded rubber containing ingredients that effect a cure without the application of heat. All of the tire accessory men carry it and for surface work it is excellent.

Third, is the cold cure cementing process. In this a cemented surface is lightly brushed over with a solution of chloride of sulphur and bisulphide of carbon. This requires experience and is not altogether pleasant because of the offensive smell.

Fourth, comes the vulcanizing or vulcanizable cements. These consist of compounded rubber dissolved in naphtha, the rubber



THE BRACKETT VULCANIZER

compound containing from 5 to 8 per cent of sulphur. Cements of this sort vulcanize when heat is applied and become a part of the rubber to which they are attached.

PATENTED MACHINES FOR RUBBER FOOTWEAR REPAIR IN THE UNITED STATES

American patents of importance on rubber footwear repairing apparatus include the following:

No. 1,206,799. Filed March 28, 1916, by Henry E. Bast, Lawler, Iowa. This is an outer cure, quick-acting vulcanizing device with an adjustably rotating lasting jack, which carries a movably adjustable former block sliding on and rotably adjustable on a

THE BRACKETT VULCANIZER IN USE

longitudinally-slotted arm rotably and adjustably mounted on the jack, and a slotted angle plate slidably and rotably adjustable in the slot of the arm. When the former block is pressed against the rubber boot or shoe to be repaired, gasoline is put into a cup-shaped recess in the upper side of the block and

ignited to produce the heat required for vulcanizing a patch, heel or sole on rubber footwear.

No. 1,238,648. Filed February 9, 1916, by Charles F. Dilks, Bridgeton, New Jersey. A rubber boot and shoe repairing device utilizing a mold to be heated with steam, an expansible last, a 2-sectional flanged clamp, and a set-screw covering the clamp and for applying pressure to the repair job. One form of the apparatus has the mold arranged to be heated from a steam line, and another provides for a self-contained mold and boiler, the latter to be heated with gas.

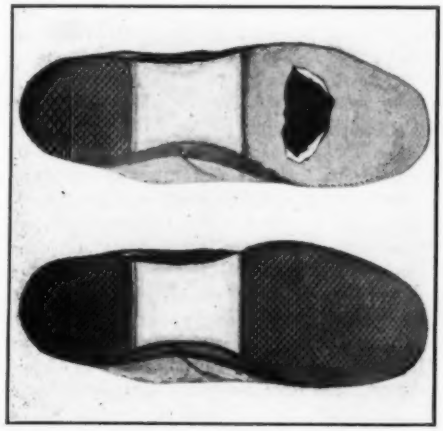
LEATHER PATCH SEWED AND CEMENTED ON RUBBER BOOT

No. 1,293,159. Filed July 25, 1918, by Charles E. Miller, Anderson, Indiana.

A rubber boot and shoe repair vulcanizer consisting of a steam table, heat for which is obtained from an attached container for gasoline or other heating fluid. The steam-table is set upon a stand and from the table projects a tubular last or form, on which a second, angular, tubular form revolves, and which latter can be fastened at various points of adjustment. Pressure upon a repair job is obtained by means of canvas bandaging belts attached to the tubular forms.

No. 1,315,200. Filed May 12, 1919, by James W. Arthur, Akron, Ohio, and assigned to the Williams Foundry & Machine Co., Akron, Ohio.

Plural-part mold for rubber boot and shoe repair attached to steam-heated container, set upon a suitable stand, and having a

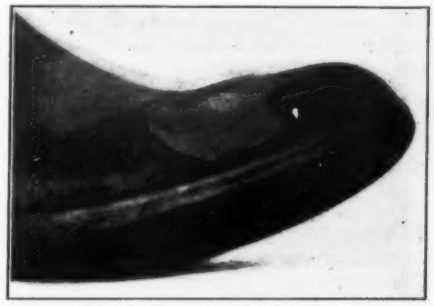


MODERN TENNIS SHOE REPAIR

tubular rotable work-supporting horn projecting from the side of the steam container, with means for adjusting the horn at desired angles and for applying exterior pressure on repair jobs carried by the horn.

No. 1,358,068. Filed July 6, 1920, by H. D. Ferguson, Dowagiac, Michigan.

In a vulcanizer for boots and shoes, the combination of a mold including a hollow bottom, side and front end walls providing a single steam chamber, a top clamp, an internal lasting support consisting of a casing of flexible material and a filling therefor of granular material such as sand, and a filling of heat conducting material between the walls of the mold and the parts to be vulcanized which are spaced therefrom.



RUBBER BOOT REPAIRED WITH SELF-VULCANIZING PATCH

THE DOMINION OF CANADA

No. 200,687. Filed December 26, 1919, by Joseph Anctil and Joseph Octave Landry, coinventors, both of Montreal, Canada.

Apparatus to resole rubber boots, utilizing a vulcanizer with a heated surface, a plate bearing an anti-skidding tread mounted on the heating plate, arms secured at one and projecting over the heating plate to which one or more boot forms can be attached, and weights mounted at the free ends of the arms and by means of which pressure can be applied in curing the repair job.

(To be Continued)

HOLLAND'S RUBBER COMMERCE, 1917-1919

A comparison of the values of imports of rubber and gutta percha and rubber manufactures into the Netherlands for the past three years is given in the following table:

Articles	1917	1918	1919
Rubber and gutta percha	$7,200	$3,600	$6,181,600
Rubber manufactures	25,600	7,600	5,675,200

Exports of rubber and gutta percha in those three years totalled $56,800 in 1917, $50,400 in 1918, and $3,961,600 in 1919. The great volume of trade in 1919 represented trade conditions in the country itself and conditions in territories which had to draw upon it for supplies during the year. A large proportion of the imports into the Netherlands are goods that pass into the interior of Europe and a large share of its exports are goods manufactured in central Europe and sent abroad by way of the Netherlands. While previous to the war the greater part of this transit trade went through the country without breaking bulk, the greater portion of this trade now represents goods bought by Dutch importers and exporters and is fairly and directly trade of the country. What was once mere transit trade became actual Dutch trade in 1919. Exports of rubber from the Netherlands to the United States in 1919 were valued at $3,135,949. Declared exports from Rotterdam included 3,015,938 pounds of crude rubber, valued $2,622,860.

RUBBER AND GUTTA PERCHA MANUFACTURES TO THE VALUE OF $218,860 were imported into the port of Dairen, Manchuria, during 1919, to be forwarded by rail to the interior. Similar imports in 1918 were valued at $67,255.

A Glossary of Words and Terms Used in the Rubber Industry—III[1]

By Henry C. Pearson

AFRICAN RUBBER—WILD

AFRICAN rubbers are not only of great historic value but are still an important market feature. That they have suffered from the abundance and cheapness of plantation rubber and that certain of the lower grades have disappeared from the market was to be expected. Furthermore, the failure so far, of vine planting gives no promise of future *Landolphia* plantation rubber. Whether or not African wild rubber will eventually disappear from the market is something not yet proven. At all events such rubber is still a factor and as a matter of record must be considered in a comprehensive listing of crude rubber sorts.

AFRICAN RUBBER. Wild rubber from Africa including Madagascar, obtained from vines as the *Landolphia, Carpodinus* and *Clitandra;* and from trees as the *Funtumia* and *Ficus Vogelii.* The latex is collected by natives by tapping or cutting down the trees or vines and is coagulated by boiling, air drying and by the use of astringent vegetable juices.

Two broad general divisions are made in East and West Coast Africans. The rubber is marketed in the shape of lumps, slabs, cakes, strips, buttons, paste, flakes, balls, niggers, twists, biscuits, spindles, nipples, nuts, thimbles, cherries, marbles, sheets, blocks, disks.

The above names are given because of the physical appearance of the rubber as it comes from the hands of the natives. The lump type, for example, is rubber that has been coagulated by boiling and is formed into any convenient shape. Spindles and most balls are made up of strips or filaments of rubber that is coagulated on the vine.

In some localities as on the Gold Coast, lumps are cut into strips or buttons by machinery and much of the moisture and foreign matter removed. African rubber thus treated is known in England as Liverpool pressed.

The trade names are usually: (1) the geographical origin or the port of shipment, as Soudan; (2) the physical shape of the rubber, as balls. African rubbers show a decided loss in washing, the shrinkage being from 7 to 50 per cent. The resin content is also large, running from 3 to 30 per cent.

ACCRA. Landolphia rubber from the Gold Coast. It is shipped in the form of small brown disks, white in cross section, veined with red and earthy. Accra lump is cut into strips and buttons and is graded as prime, seconds, and thirds. The lower grades are flake and paste. The shrinkage is 30 to 45 per cent.

ASSINEE. Landolphia, Ficus and Funtumia rubber, from the Ivory Coast, Grand Bassam being the port of shipment. It comes in marbles of ½ to 1¼ inches in diameter, is brown in color, cuts yellow, and contains almost no impurities. It is firm and of good quality. It is graded as follows: Assinee-silky, Attoaboa, Lahou, Bayin, half jack. Shrinkage 25 to 35 per cent.

ADDAH NIGGERS. Landolphia and Ficus rubber from Togo, and graded No. 1 and No. 2. Comes in small balls, dirty, reddish brown in color. Shrinkage 10 to 35 per cent. Known as Quittah and Lomi.

ADELI NIGGERS. See Konakry.

ALIMA. See Congo.

AMBRI. Low grade Angola, chiefly in thimbles or nuts. See Benguela.

ANGOLA. See Benguela.

ARUWIMI (Mongala, Bumba). Landolphia rubber from the Upper Congo. Comes in large balls, like Equator and Lopori. Is tacky, wet, often fermented and much adulterated. Shrinkage 30 to 35 per cent. See Congo.

ATTOABOA. See Assinee.

BASSAM. See Grand Bassam.

BARABAJA. See Madagascar.

BASSAO. See Gambia.

BATTA BALLS. See Cameroons.

BAYIN. See Assinee.

BATANGA BALLS. See Cameroons.

BEIRA. See Mozambique.

BENIN. See Old Calabar.

BENGUELA. Landolphia rubber from Benguela shipped in pressed balls. It is of reddish brown color, contains some vegetable debris, sand and earth, and is of poor quality. Is also graded as sausage and thimbles. Of the latter No. 1 is clean and tough, and No. 2 contains considerable red leaf. Shrinkage 20 to 40 per cent. Also known as Loanda and Angola.

BOULAM. See Gambia.

BROWN CURE (Brown Slab). Low grade of Madagascar niggers. See Madagascar niggers.

BUMBA. See Aruwimi.

CAPE COAST. See Gold Coast.

CASAMANCA (Boulam). See Gambia.

CAMEROONS. Rubber both from the Landolphia and the Funtumia in balls, biscuits and twists. Shrinkage, 20 to 45 per cent.

CACHES. See Gambia.

CONGO. A general name for rubber from the Independent Congo State and adjacent territories. The rubber is the product of Landolphias and Funtumia, either alone or in admixture. It comes in the form of buttons, balls, red and black thimbles, and twists. Congo ball, generally known as Kassai, is the best grade. The twists are among the toughest of African rubbers. The better grades are black or deep brown in color and contain but little moisture. The rubber has a woody smell and the lower grades contain bark and moisture. Shrinkages vary widely from 7 to 35 per cent. Some of the well-known grades are Kassai, red and black Kantanga, and Wamba.

CONAKRY. See Konakry.

DJUMA. See Congo.

DONDE BALLS. See Zanzibar.

DONDE MARBLES. See Zanzibar.

EQUATOR. African rubber from the Congo, which comes in balls glued to each other, and is much esteemed in quality. The balls are often small and mixed. It is dark, dry and clean, but contains some fermented rubber which smells badly. See Congo.

FRENCH CONGO. See Congo.

GRISTLY. See Madagascar.

GABOON. Landolphia rubber from the French Congo, which comes in short strips or flakes stuck together, but not amalgamated; balls, bulky lumps, which assume the shape of the containers, and flake. Large balls are graded as large O balls, and small ones as small O balls. The strip is black and contains few impurities. The ball is brown, moist and tacky but clean. Cross-section cuts develop pockets full of liquid. The flake is soft, free from dirt and spongy. Other names are Loango, Mayumba and Congo. Shrinkage, 25 to 45 per cent.

GRASS RUBBER. See Root Rubber.

GAMBIA. Landolphia rubber from the left bank of the Casamanca River in British Gambia and Portuguese Guinea. It comes in the form of marbles, weighing from one to four pounds, and in balls and niggers. It is made of latex from different species and loses its value by reason of these admixtures. A cross-section shows concentric circles, either red, brown or white, the center being amber in color. There is little débris in it and it is very moist. Shrinkage is 15 to 30 per cent. Gambia from

[1]Continued from THE INDIA RUBBER WORLD, February 1, 1921, pages 325-7.

the left bank of the Casamanca River, shipped from the port of Zighinchor, is called Casamanca and is like ordinary Gambia. Casamanca Boulam is shipped from the port of that name. It comes from the uplands, however, and is like Senegal rubber, deep brown throughout, wet and foul, and contains earth and sand. The shrinkage is 30 to 50 per cent.

GAMBIE. A, AM, and B. These are of the nigger type. See Gambia.

GRAND BASSAM.. See Assinee.

GOLD COAST. Carpodinus and Clitandra rubber, chiefly in lump from strips and buttons. It also comes in biscuits and niggers, hard and soft. The flake is wet and foul smelling. Shrinkage, 30 to 55 per cent.

HALF JACK. See Assinee.

IBO. See Mozambique.

IKELEMBA. See Congo.

INHAMBANE. See Mozambique.

ISANGA. See Congo.

IVORY COAST. See Assinee.

JAKOMA. See Congo.

KASSAI. See Congo.

KONAKRY. Landolphia rubber from French Guinea. Comes as Massai and Adeli. Similar to Gambia. Shrinkage, 15 to 44 per cent.

KATANGA. See Congo.

LOANGO. See Gaboon.

LAHOU. See Assinee.

LAMU. See German East Africa.

LIBERIA. Landolphia rubber from the state of that name; comes in small balls, brown or black in color, and is wet and contains vegetable matter and sand. It is graded as lump, hard flake and soft. Shrinkage 20 per cent to 40 per cent.

LINDI BALLS. See Zanzibar.

LAMU BALLS. See Zanzibar.

LOANDA. See Benguela.

LOMBIRO. Cryptostegia rubber from Madagascar. See Madagascar.

LOPORI. See Congo.

LOURENCO MARQUEZ. See Mozambique.

LOMI. See Addah Niggers.

LOWER CONGO. Carpodinus and Clitandra rubber from the Congo and Angola. See Congo.

LUVITUKU. See Congo.

LAC LEOPOLD. See Congo.

LAGOS SILK. Rubber from the Funtumia, sometimes Ficus. Shrinkage 30 to 40 per cent. See Old Calabar.

LAGOS LUMPS. Biscuits and strips from Landolphia rubber. Shrinkage 40 to 60 per cent. See Old Calabar.

MADAGASCAR. Landolphia, Cryptostegia and Euphorbia rubbers from the island of that name. The general designation is East Coast and West Coast. The rubber is coagulated by salt water and by boiling. The principal port of shipment is Tamatave. It comes in large dark brown or black balls known as niggers, red ball, gristly, black ball, and also in balls of a red brown, as pinky, and in irregular rounded lumps, wet and earthy. Shrinkage 25 to 45 per cent. The grades are as follows: Tamatave or prime pinky Tamatave, which is the best grade; Majunga; East and West Coast; balls, red, black and gristly; brown cure, a low grade of slab; white virgin sheet; unripe balls containing much bark. Madagascar rubber bears the names also of localities as Morondava, Barabaja.

MAJUNGA. See Madagascar.

MAYUMBA. See Gaboon.

MASSAI. See Sierra Leone.

MOSSAMEDES. See Benguela.

MONGALA. See Aruwimi.

MOZAMBIQUE. Landolphia rubber from Portuguese East Africa and from Natal shipped in marbles and balls, spindles, sausage, sticks and liver. It is white, orange, and black, contains little moisture but is considerably adulterated with vegetable debris and sand. The best grade is orange ball No. 1, 2 and 3. The spindles are graded as removed and unripe. Ports of shipment are Lourenco Marquez, Inhambane. Beira and Ibo are also used in designation.

MOMBASSA. See Zanzibar.

"MGOA." See Zanzibar.

NUNEZ. See Rio Nunez.

NIGER. See Old Calabar.

NYASSA. See Zanzibar.

ORANGE BALL. See Mozambique.

OLD CALABAR. Funtumia rubber from Southern Nigeria and the Cameroons shipped in the form of balls stuck together and is called block balls. Known as Benin and Niger, also as silk rubber and Lagos silk rubber.

QUITTAH. See Addah Niggers.

ROOT RUBBER. Rubber obtained by maceration and beating from the roots of aberrant Landolphias, as Clitandra or Carpodinus. See Congo.

RIO NUNEZ. Landolphia rubber from French Guinea and adjacent territory. Comes in balls and strings.

SALT POND. See Gold Coast.

SANKURU. See Congo.

SENEGAL. See Soudan.

SOUDAN (Senegal). Landolphia rubber from French Senegal and the Soudan shipped in the form of more or less bulky masses or in flat sheets. Reddish brown in color and contains bits of wood, earth, and some moisture; very inferior. Ports of shipment are Kayes, Bakel and White Cape. Shrinkage 25 to 50 per cent.

SIERRA LEONE. Landolphia, Funtumia and Ficus rubbers. It comes in niggers, cakes, twists, balls and sheets. It is of a dirty reddish brown color, contains impurities and moisture. Is also known as Manoh. Shrinkage 10 to 40 per cent.

SILK RUBBER. Funtumia rubber from Lagos and Southern Nigeria. See Old Calabar.

TAMATAVE. See Madagascar.

TAVA. See Congo.

TANGA. See Zanzibar.

UELLE. See Congo.

UPPER CONGO. See Congo.

WAMBA. See Congo.

WHITE VIRGIN SHEET OR SLAB. See Madagascar.

ZANZIBAR. Landolphia rubber shipped from Zanzibar and Central Africa. It is like Mozambique and contains similar adulterants. Marketed as Nyassa, Lindi balls, Donde marbles, Lamu balls, Mombassa, Tanga, "Mgoa." Shrinkage 30 to 50 per cent.

RUBBER STAMPS IN ARGENTINA

There are several establishments in Buenos Aires whose business is the manufacture or sale of rubber stamps. The rubber stamp gum was all imported previous to the war, but since 1914 a local mechanical rubber goods company has supplied the entire demand at prices lower than those for foreign rubber. The local concern probably will continue to occupy its favorable position in the trade, because of the lesser duties paid for the raw materials and because of lower labor costs. The quality of the domestic product is stated to be perfectly satisfactory.

ACCORDING TO A CENSUS OF MOTOR CARS IN SWEDEN, TAKEN June 1, 1920, there are 8,506 cars and trucks and 9,059 motorcycles in the entire country; of these Stockholm has 2,137 cars and trucks and 1,015 motorcycles. Recent information indicates that the January, 1921, registration will show more than 13,000 cars and trucks in Sweden, due to the heavy importations during 1920.

How Crude Rubber Is Milled and Marketed in Malaya

By Richard Hoadley Tingley

GOING SOUTH on the railway from Penang through the Federated Malay States, cultivated rubber estates are practically continuous until the junction at Tampin in Negri Sembilan is reached. The line passes through mile after mile of continuous hedge of plantation trees broken at intervals by areas of jungle—some in the process of being cleared—and by tin mining operations. For much of this district the planted area to the west extends to the sea, and to the east to the foothills of the mountains which range, north and south, the entire length of the peninsula. This area is approximately 200 miles long by four or five miles wide and contains a total area of between 600,000 and 700,000 acres. Continuing south to Johor Bahru, a distance of 133 miles, the cultivation is somewhat more scattered as seen from the railway. In the State of Johore, however, practically nothing but rubber is seen as one journeys south to the straits that separate the mainland from the Island of Singapore. It is this section that produces most of the Malayan rubber of commerce.

Rubber raised on the big British estates along this line comes into the market thoroughly washed, cleaned and milled, packed and ready for export to the consuming factory. The operation is all done at the plantation, where every modern facility exists for scientific preparation. Most of this product finds its way to the big tire factories—some of it coming from plantations owned or controlled by them. But even the biggest of the tire and other factories do not produce on their plantations as much rubber as they consume at home, and are constantly in the market at Singapore, Penang and Kuala Lumpur for the product of the big British and other estates that bring their rubber into the market in a finished condition.

The larger portion of the rubber coming from this section is fully milled at the plantation and needs no further treatment before it reaches its factory destination. It is of the other—the smaller portion—that I propose to write, which amounts to many thousands of tons a year.

Henderson Brothers, Limited, Singapore
FACTORY ENTRANCE

THE UNMILLED RUBBER MARKET OF MALAYA

This rubber is grown on the smaller British, Chinese and native plantations which maintain no milling factories, a large part of whose product, therefore, must be thoroughly treated before it is marketable for export. There are many estates whose annual product is large enough so they might well afford to install their own mill and thus obtain a price higher than can be had for the unmilled product. Lack of working capital has deterred many from doing so, particularly the smaller Chinese and native planters. Others, too, are anxious to get rid of their rubber as soon as made, thus realizing quick cash, and are content to accept a reduction in price in consequence.

At such plantations the coagulated rubber is put through smooth hand-rollers and the resultant is known as unsmoked sheets.

Henderson Brothers, Limited, Singapore
MILLING AND CONDITIONING RUBBER

Many localities have their own special distinctive unsmoked sheets—each differing from another in certain characteristics. Some are more careful and thorough in the manner of treating the sheets; some use adulterants of one kind or another, the most common being jelutong and sago flour, both of which have a most harmful effect on the rubber. It is thus that the trade has given distinctive names to the sheets coming from this district or that, as Muar, Kuala Kangsa, Djambi, etc. (the latter coming from Sumatra), which identifies them at once as to quality and serves, in a large measure, to fix their relative price in the market. Large quantities of scrap and lump rubber also come into the market at Singapore from the small plantations, which must be milled before it is exportable.

The arrival of large quantities of such rubber at Singapore and Penang in this unusable condition has led to the establishment of milling plants at these ports where the unmilled product is washed, cleaned and made into the crêpes of commerce. In former times much of this rubber was shipped in what is now considered an unexportable condition, in other words, in a partly cured, dirty, barky state—to be milled upon its arrival at its destination in the United States or Europe.

THE HANDICAP OF THE SMALL OPERATOR

The desirability of a milling plant where the rubber offered from the smaller plantations can be converted into an exportable product, is obvious. In the first place, the small operator is barred from buying from the big American estates because they have little for sale—their own requirements consuming most of their output. The large British estates, also, cater to the big American users who always have buyers at hand that take most of their finished product. This constitutes the big market and represents

the larger portion of an annual Malayan output. The chief reliance of these buyers is, of course, the large estates that maintain their own milling plants at the plantation and whose rubber is sold, ready for shipment. The small Chinese and native plantation owner is not debarred, however, from this market by reason of the unmilled condition of his product since the process can be performed, and frequently is performed, by local independent mills at Singapore.

The small Chinese and native producers are scattered throughout the entire western slope of the Peninsula from Johore to the Province of Wellesley and beyond. Many of them are, in reality, but small farmers that cultivate and market all kinds of produce —rubber being but an incident. Chinese merchants or brokers (at times they may be either broker or merchant, as the case demands) travel about continually, picking up a few unsmoked

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ONE OF THE DRYING ROOMS

sheets here and there. Assembling these at Singapore or Penang, the principal market is found with the independent brokers or merchants who maintain their own milling plants, where the sheets may be treated and made ready for export. This operation is often subdivided. The Chinese broker who travels about gathering in the sheets sometimes finds his market with another Chinese broker at one of the lesser cities or towns, as Kuala Lumpur or Klang, who, in turn, sends them to the port market.

The total volume of business done in unsmoked sheets in this manner is large. There are, however, a multitude of people engaged in their production, assembly and marketing. Supplies of this kind often come into port in very small lots by wagon or bullock cart. Often, however, a sufficient quantity is assembled for a reasonable rail shipment before being moved. Depending on market conditions, this rubber may be sold at once on sample (or even in advance on sample) and taken directly to the mill —or it may have to be warehoused (godowned) pending disposal.

MALAYAN RUBBER MARKET DEAD

At the present time there is practically no market either at Singapore or Penang, in the strict sense of the word—and this condition has obtained for several months. Brokers run in and out of Chinese and British offices trying to get an idea of what prices really are when, in fact, there is practically no market that does not represent speculation. Malayan prices are largely controlled by London and London standards are followed—at least, in theory, though this does not always follow. Business in rubber has fallen into such a disordered state that if London prices are reported up a farthing, the Malayan market, or rather the sellers, instead of raising a penny, generally try for a four or five-cent raise, with the result that nothing happens.

Malaya is always optimistic and believes the United States is holding back on buying in order to bear the market. The dealers cannot dispossess themselves of the notion that America is short of rubber and must soon come into the market, whether or no. A farthing or so in advance in London is therefore construed locally to be the forerunner of a big demand—a big advance in price—and the local dealers want to be the first to discount the rise. For the same reasons, on a declining market, they hold on for dear life—still believing it to be a Yankee trick to unduly depress the market. On a big drop, however, they become panicky and frightened and rush to cover.

For the above reasons the Malayan Peninsula has become almost an impossible market during the past fall and winter and wise buyers can do little but watch out for sharp declines, wait a day or two, and then, often, fair bargains may be obtained. To a buyer who knows the local crowd and their ways and who watches their faces as they flit about among the offices, a trade can sometimes be made several cents under the actual London market. For long periods, however, during the past fall and winter, a most unusual price condition has obtained, making it almost impossible to do business. For long intervals New York has been the lowest market in the world, with London a little higher, then Singapore, Penang, Batavia, in order, with Colombo the highest. Often this relation might change somewhat, but New York and London have been generally lower than at producing centers. At times Penang has led at the top-notch price. The apparent reason for this anomaly is the distrust that haunts the Eastern mind of the sincerity of the American and the firm belief that he will soon come back into the market with a rush.

INDEPENDENT MILLING PLANTS

It is with conditions such as described that the local buyer for a house outside the big combinations has to contend in buying the unmilled product. It is the disorganized condition of the unmilled rubber market that has caused the establishment of

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NATIVE TAMIL AND CHINESE EMPLOYES

independent milling factories at some of the largest trading centers. In the entire Malayan rubber district there are many such plants, large and small. They range in capacity from one ton to 20 or 30 tons a day. Around Singapore there are probably fifteen or twenty; around Penang, perhaps ten or twelve, all Chinese. Some of them, however, are very small.

One large plant employs upwards of 600 men and women, all told, and has a capacity for milling and conditioning about 20 tons of unmilled rubber a day. It is equipped with many milling machines, a portion of which are shown in the accompanying

photographs. Three classes of rubber come to the factory for treatment: (1) rubber to be remilled; (2) rubber to be re-

Henderson Brothers, Limited, Singapore
"COOLIE LINES" OR NATIVE QUARTERS

treated, and (3) rubber to be packed for export shipment.

Class 1 comes in various forms, such as balls, sheets, crêpe, scrap, lumps, etc. It all contains a certain amount of bark, dirt and other foreign matter.

Class 2 is mostly ribbed smoked sheets, often mouldy or badly treated in the first place. The mouldy sheets are washed and hung in the smokehouse—and the same with the sheets that have been improperly treated.

Class 3 is bought in bulk lots of crêpe or other sheets and is selected according to established standards. When this has been done it is packed for shipment without further treatment.

Class 1 material is received at the store room, selected there, taken to the milling room for recrêping and then hung in the drying room. When dry the sheets are taken to the storehouse, reselected, and finally stored in the house set aside to receive rubber ready for shipment, and there packed. The milling process consists of passing the rubber through two-roll mills while a continuous spray of water is played upon it, thus washing out all dirt and foreign matter.

The typical factory shown in the illustrations is complete in all details with ample "godown" buildings on the premises. It is built for service and utility and is equipped, not only for economic treatment of rubber, but for the comfortable housing of its coolies, as the long row of "coolie lines" will testify. In its construction and installation, too, much good taste has been displayed, as will be seen by the somewhat ornate and elaborate entrance shown in the illustration. It stands out in striking contrast to the unadorned and austere appearance of most United States factories.

The Peachey Vulcanization Process

OUR READERS are already acquainted with the Peachey process for the vulcanization of rubber through descriptions already published in these columns.[1] Further interesting practical details are found in a recently published paper on this process by S. J. Peachey and A. Skipsey[2] from which the following has been abstracted.

The authors concede that while a vulcanized rubber of excellent quality is yielded by the Goodyear process yet this method possesses certain disadvantages, viz.: (1) It necessitates the continuous use of steam both as a heating agent and as a medium for exerting pressure on the goods under treatment to avoid the development of porosity; (2) it is a comparatively slow process; (3) it restricts the manufacturer in his choice of filling and coloring agents. The manufacturer thus has to depend chiefly on inorganic compounding materials and a limited range of mineral pigments. The majority of coal-tar dyestuffs are destroyed or modified by the action of sulphur at 140 degrees C., hence delicate tints are practically unobtainable with the usual process of vulcanization.

The new process removes these restrictions and renders possible new technical and artistic effects in rubber goods. The discovery of the process resulted from an investigation on the behavior of rubber towards different forms of sulphur. Sulphur is remarkable for the number of allotropic forms which it is capable of assuming. In all three states of aggregation—solid, liquid and gaseous—sulphur appears to be capable of varying its molecular complexity. An attempt was made to compare the action of these different forms of sulphur on rubber. This attempt was interrupted by the discovery that the interaction of sulphur dioxide and hydrogen sulphide produces momentarily a form of sulphur which rapidly combines with rubber at the ordinary temperature, yielding an effective vulcanization. The reaction between the two gases must take place in contact with the rubber or no vulcanization results. The sulphur is active only at the moment of liberation, and it is fair to assume, therefore, that the effect is produced by atomic sulphur.

In applying the new process the rubber is exposed alternately to the action of sulphur dioxide and hydrogen sulphide. The gases readily diffuse into (probably dissolve in) the rubber, and there interacting produce active sulphur which immediately combines with the rubber at the ordinary temperature, yielding a product wholly comparable with that obtained by the Goodyear hot process. Evidence is accumulating to show that the product is actually superior in strength; this may be explained by the fact that the depolymerization of rubber produced by heat is avoided in the new process.

The process appears to be of fundamental importance for the following reasons:

(1) It is a true sulphur vulcanization—as distinct from the sulphur chloride vulcanization produced by Parkes' "cold cure."

(2) It eliminates the use of heat and to a great extent the use of mechanical pressure.

(3) It employs two gases, both of which can be produced on a large scale at a very cheap rate.

(4) It is rapid in action.

(5) It enables the manufacturer to employ organic filling agents which cannot be used in conjunction with the hot process or with the Parkes process (most organic materials are attacked and destroyed by contact with sulphur chloride).

A number of cheap and highly durable materials may be fabricated from various wastes in this manner and employed as floor and wall coverings, for boot and shoe manufacture, and for fancy leather goods and upholstery work. Further, in numerous manufacturing processes unconnected with the rubber industry the process renders possible the use of rubber as a binding agent for fibrous and granular materials as an alternative to the resins,

[1] THE INDIA RUBBER WORLD, May 1, 1920, page 532.
[2] Journal of the Society of Chemical Industry, Volume XL., No. 1, January 15, 1921, page 5T.

bitumens, gums, and like substances which have hitherto been employed, with the result that the toughness and flexibility of the products are considerably increased.

(6) Coal-tar dyestuffs and even natural dyes like chlorophyll, which, with a few exceptions, are destroyed by the hot cure and also by the sulphur chloride cure, can be introduced into rubber mixings to be cured by the new process with the production of delicately-tinted materials hitherto quite unobtainable.

The process possesses the advantage of extreme simplicity and its translation from the laboratory to the works should prove a simple matter.

The process can be extended to the vulcanization of rubber in solution. If a solution of rubber in benzol or naphtha be saturated wholly or partially with hydrogen sulphide and mixed with a solution of sulphur dioxide in the same solvent, the liquid sets in a few moments to a stiff jelly, and on eliminating the solvent by evaporation a fully vulcanized rubber is obtained. The use of the mixed solutions for producing perfectly vulcanized seams and joints has proved highly successful, and inner tubes repaired by the new process have an excellent life.

Further, by the use of the solution process, reformed leather soles and heels may be attached to boots without the aid of stitching or nailing. In fact, an entire boot may be produced from the reformed leather without stitch or nail being necessary.

PRACTICAL WORKING OF THE PROCESS

Mr. Peachey said that in working the new process the two gases are introduced separately, both being comparatively easily soluble in the solid rubber, especially the sulphur dioxide. The amount of sulphur dioxide absorbed by rubber is surprising. Hydrogen sulphide is more than sufficiently soluble to yield a coefficient of vulcanization up to five, which was higher than required in practice. Adsorption is not relied upon at all, but absorption of the gas followed probably by solution. Generally speaking, excess gases, as far as could be judged by smell, are driven out of the rubber after about one hour's exposure. The practice has been followed throughout of giving the shorter sulphur dioxide treatment first, finishing up with the hydrogen sulphide in excess, so that there was very little possibility of free sulphur dioxide remaining and practically no danger of free acid forming.

To get a fully vulcanized rubber it was only necessary to introduce 2½ per cent of sulphur; therefore the amounts of the two gases required to vulcanize a mixture containing 50 per cent of rubber were surprisingly small, and a negligible amount of water only is produced. The water diffuses out of the rubber quite rapidly. It never exists in the liquid form in the finished product, and the vulcanization need not be followed by any drying operation. Exposure to the air for a few hours causes all necessary elimination of water.

As regards the free sulphur present in antimony sulphide and ultramarine, it is disadvantageous to have free sulphur present in a mixing which is to be vulcanized by the new process. It tends in some way sympathetically to convert the atomic sulphur into molecular sulphur. In all mixings made for the new process ordinary sulphur would not be present, and the use of antimony sulphide would be especially avoided, as that substance could be replaced by much better and brighter colors. In the "dry" treatment the rubber or rubber mixing to be vulcanized is exposed to sulphur dioxide for ten minutes, after which a very short exposure to the air is given to remove the adsorbed gas from the surface. The material is then introduced into another chamber where it is exposed to the hydrogen sulphide for 20 to 30 minutes.

In the case of "solution vulcanization," it is very easy to prepare standard solutions, and in practice a standard solution of sulphur dioxide is prepared by weight. It is convenient to use a solution containing 0.8 per cent of this gas in benzene. Saturate a 10 per cent rubber solution with hydrogen sulphide, and mix four volumes of the hydrogen sulphide solution containing the rubber with one volume of the benzene solution. The actual proportion of the two gases interacting is theoretical. Small amounts of free sulphur are invariably formed in the rubber. The combination is not quite complete, as apparently a small amount of the atomic sulphur is changed into molecular sulphur, but the amount is small compared with the amount left in the rubber by the "hot" process.

It was a matter of surprise to learn that one experimenter with the new process found acid in his samples; possibly he used the sulphur dioxide in excess. Mr. Peachey, in his own experiments, invariably kept the hydrogen sulphide in excess, and by treating the rubber first with sulphur dioxide and then with hydrogen sulphide the formation of any trace of free acid can be avoided. If, however, faulty working leads to the formation of a trace of free acid the material can be treated with ammonia, just as in the sulphur chloride process.

The question of the treatment of rubber one inch in thickness is rather beyond the present limits of the process. The porosity of a mixing is actually greater when fairly heavily loaded, and the penetration obtained is surprising. Although exact diffusion figures were not available, it might be assumed that both sulphur dioxide and hydrogen sulphide diffuse into rubber at least as rapidly as carbon dioxide, and in the case of sulphur dioxide more rapidly. One would not attempt by the new process to deal with material one inch thick, but would avail oneself of the new method of building up which has become possible as the result of the new solution process.

It is possible now to build up material of any thickness after it has been vulcanized in sheets and to get a solid mass in which the joints will prove of equal strength to that of the material itself. The treatment of thick articles involves new methods of building up, and it is quite desirable that such new methods should be introduced. The leather compounds prepared by this process are 2½ times as durable as new leather.

PRIORITY OF PEACHEY'S PROCESS QUESTIONED

DUBOSC'S CLAIM

THE eminent French rubber chemist, André Dubosc, has put forward a claim[1] to have anticipated S. J. Peachey's discovery of cold vulcanization of rubber by gases, by his article entitled "An Hypothesis as to the Process of Vulcanization,"[2] which stated, in part, as follows:

"Sulphur is capable of existing in seven or eight different forms, only one of which, *the colloidal form*, is in evidence in the vulcanization process. What is used technically is ordinary commercial sulphur, which is the polymerized form; evidently there must be a preliminary reaction consisting in the change from ordinary to colloidal or depolymerized sulphur before the union between the rubber hydrocarbon and sulphur can take place.

"When *pure* rubber and sulphur are heated together under ordinary vulcanizing conditions, the quantity of sulphur entering into combination is very small, and the product has an insignificant strength and elasticity.

"When rubber containing resins and proteids is heated with sulphur under the same conditions, sulphur is fixed by the rubber in nominal amounts and the product has the well known properties of vulcanized rubber.

"When resins are heated with sulphur, hydrogen sulphide is produced and with the 'insoluble portion' of crude rubber, consisting of proteids and oxidized rubber, the reaction produces hydrogen sulphide and sulphur dioxide.

"The rôle of resin, the insoluble part of rubber, or a metallic oxide, is simply to give rise to the production of sulphur dioxide, hydrogen sulphide, and metallic sulphides. By this means the octatomic sulphur is transformed into the monatomic form which

[1] The India Rubber Journal, January 22, 1921, page 21.
[2] Le Caoutchouc et la Gutta-Percha, March 15, 1915, page 8601. Translation in The India Rubber Journal, May 1, 1915. Abstracts in THE INDIA RUBBER WORLD, May 1, 1915, page 428.

enters into the compound as hydrogen sulphide or sulphur dioxide.

"The researches of Graham and others on the osmose of various gases through rubber have shown *that both the gases mentioned above are absorbed in considerable quantities by rubber, which means that they diffuse readily.* The reaction between sulphur dioxide and hydrogen sulphide is—

$$2H_2S + SO_2 = 2H_2O + 3S$$

the products being water and monatomic or colloidal sulphur. All of this sulphur which was present as sulphur dioxide or hydrogen sulphide diffused through the mass of rubber has been transformed into colloidal sulphur capable of uniting with the rubber and saturating the double bonds of the caoutchouc molecule."

PEACHEY'S REPLY

"By what chain of reasoning Dubosc considers himself entitled to father the new cold process of vulcanization as a consequence of the publication by him of a hypothetical explanation of the old hot process is by no means clear, and the writer would welcome further enlightenment.

"Dubosc states that only one form of sulphur is in evidence in the vulcanization process in the ordinary hot sulphur cure, namely, the colloidal form, and that the first step in the process is the breaking down of ordinary, or polymerized, sulphur into colloidal, or depolymerized, sulphur.

"This statement is contradicted by the very axioms of colloidal chemistry, which affirms that colloidal bodies possess a high degree of polymerization, and that the more complex the molecule, the more pronounced is the colloidal character.

"Dubosc overlooks the fact that the temperature at which vulcanization is effected in the hot process (140 degrees C.) lies well above the melting point of sulphur (114 degrees C.), and that molten sulphur (which at 140 degrees C. consists of an equilibrium mixture of two well-recognized forms of the element) can alone be concerned in the change. It should be noted that the present writer claims that vulcanization is effected by means of atomic sulphur produced momentarily by the interaction of hydrogen sulphide and sulphur dioxide at the ordinary temperature. To convince physical chemists that atomic sulphur is identical with colloidal sulphur will indeed prove a difficult task.

"Dubosc further states that when pure rubber and sulphur are heated together to the vulcanizing temperature, the amount of sulphur entering into combination with the rubber is very small, and that the product does not possess the characteristics of vulcanized rubber. This statement is not based on facts. Pure rubber has never been prepared, but rubber which has been subjected to the most drastic method of purification available will still vulcanize, even up to the ebonite stage, when heated with sulphur. It is purely a matter of the amount of sulphur and the duration of the heating.

"The statement, 'When resins are heated with sulphur hydrogen sulphide is produced,' calls for one comment only, viz., that the natural resins are not hydrocarbons but are oxy-compounds usually of an acid character. The further statement that the heating of the 'insoluble portion' of rubber with sulphur leads to the formation of both hydrogen sulphide and sulphur dioxide would require that oxidation and reduction of sulphur should proceed simultaneously in a single reaction, which is in the highest degree improbable.

"As regards the suggestion that sulphur dioxide plays a part in the hot vulcanization process and that the requisite amount is derived from the interaction of the sulphur with a metallic oxide in the presence of air, it is sufficient to mention that a solution of rubber in xylene, free from and out of contact with air, and containing no metallic oxide whatever, can be effectively vulcanized by heating with sulphur to a temperature of 135 to 140 degrees C. for several hours. The writer would ask M. Dubosc to suggest the source of the sulphur dioxide in this particular experiment.

THE CASE OF PURE EBONITE

"How can Dubosc's hypothesis be made to fit the case of the production of pure ebonite, made by heating together 100 parts of plantation crêpe and 50 parts of sulphur between platens of a press at 140 degrees C. sufficiently long to yield a product containing 32 per cent of sulphur? If Dubosc's theory were correct and the sulphur combining with the rubber were produced by the interaction of hydrogen sulphide and sulphur dioxide, then for every 100 gr. of rubber converted into ebonite, about 20,000 cc. of the former gas and 11,000 cc. of the latter would require to be generated by the interaction of the sulphur with the resins and the occluded air in order to effect the complete vulcanization. Does M. Dubosc suggest that plantation crêpe contains sufficient quantities of resins and occluded air to yield the amounts of the two gases calculated on the basis of his hypothesis?"

Consumption of Automobile Tires in 1920

RUBBER COMPANY STATISTICIANS in Akron estimate that the 9,295,252 motor vehicles registered in the United States in 1920 require about 32,000,000 tires annually to replace those worn out at the rate of 3½ tires per vehicle. This estimate admits a small allowance for solids used on trucks.

Tire consumption thus averages about 2,700,000 each month, exclusive of tires needed for new equipment.

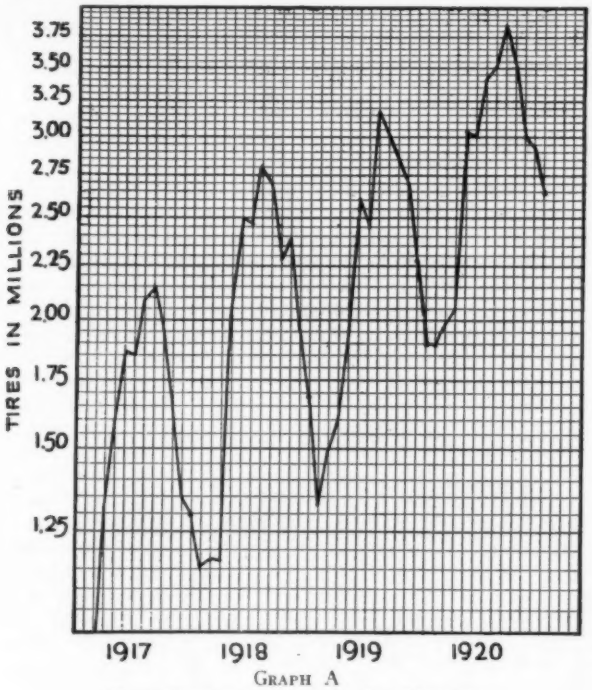
Estimates of tire consumption have not as yet, so far as known, been based on tire mileage and gasoline consumption. Such a basis, however, offers an opportunity to estimate probable rather

TABLE I

MONTHLY CONSUMPTION OF GASOLINE AND TIRES

	1917		1918		1919		1920	
	Gasoline, Gallons	Tires	Gasoline, Gallons	Tires	Gasoline, Gallons	Tires	Gasoline, Gallons	Tires
January	.....	875,000	143,967,669	1,155,000	169,256,877	1,355,000	238,204,518	1,905,000
February	.....	885,000	147,204,377	1,175,000	185,900,192	1,490,000	248,395,214	1,990,000
March	.....	1,325,000	219,462,185	1,755,000	204,004,317	1,610,000	256,020,539	2,055,000
April	.....	1,600,000	265,151,411	2,120,000	243,440,615	1,950,000	297,001,120	2,375,000
May	.....	1,880,000	311,524,603	2,500,000	328,277,648	2,625,000	378,912,672	3,030,000
June	.....	1,850,000	303,255,608	2,460,000	305,960,438	2,450,000	427,242,862	3,420,000
July	259,630,336	2,090,000	352,589,555	2,820,000	397,591,158	3,180,000	434,868,997	3,525,000
August	268,478,623	2,150,000	337,659,668	2,700,000	376,484,274	3,010,000	479,741,391	3,840,000
September	245,475,851	1,960,000	284,435,982	2,275,000	366,625,742	2,835,000	450,888,670	3,510,000
October	207,049,371	1,660,000	298,186,557	2,385,000	338,429,709	2,700,000	384,802,246	3,080,000
November	166,703,910	1,350,000	245,269,244	1,960,000	284,620,049	2,275,000	366,831,265	2,935,000
December	163,183,611	1,300,000	210,116,502	1,680,000	238,245,230	1,900,000	300,000,000*	2,400,000
Totals	2,694,704,251	18,925,000	3,074,791,178	24,985,000	3,437,960,726	27,380,000	4,262,909,494	34,065,000

*Estimated

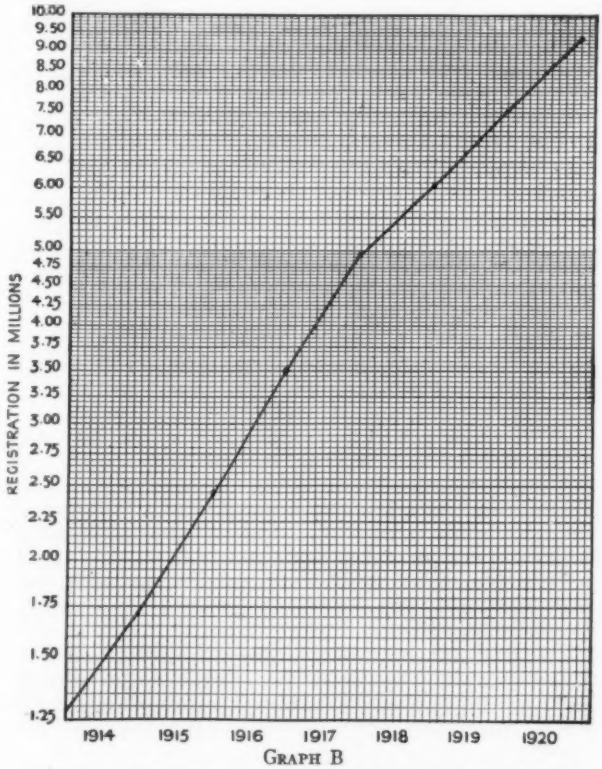


GRAPH A

TIRES CONSUMED MONTHLY IN MILLIONS

than average monthly totals of the number of tires consumed.

In the figures given by the United States Bureau of Mines the domestic monthly consumption of gasoline is given in gallons.



GRAPH B

UNITED STATES MOTOR VEHICLE REGISTRATION 1913-1920 INCLUSIVE

Since these figures include gasoline consumed for all uses a reduction is necessary to determine that used by passenger cars only. The allowance to cover all other uses has been taken at 20 per cent.

The ratio between tires and gasoline consumed is based on reported official cost data[1] modified by the statement of the American Automobile Chamber of Commerce that 70 per cent of the cars registered are classifiable as small and 30 per cent as large. The average number of miles per gallon of all cars is thus taken at 17 miles. The average usefulness of a pneumatic tire is taken at 5500 miles. The ratio of worn out tires to gallons of gasoline is thus found to be one to 100. In other words, one per cent of the gallons of gasoline consumed represents the number of tires consumed; thus every 100,000 gallons of gasoline represents 1000 tires.

In Table I the monthly domestic consumption of gasoline is given as far as available and the estimated corresponding numbers of tires consumed. It is interesting to note that the method adopted results in a total annual consumption of 34,065,000 tires. This practically agrees with the generally accepted trade view and is not greatly in excess of the figure of Akron experts quoted above.

Tires consumed monthly from 1917 to 1920, inclusive, are charted in graph A. The similarity in seasonal distribution indicated is notable, as well as the rapid growth which parallels the annual increase in vehicle registrations.

Table II records the official registration of motor cars in the United States for the period from 1913 to 1920, and the figures are charted in Graph B.

TABLE II

REGISTRATION OF MOTOR VEHICLES

Year	Cars
1913	1,254,971
1914	1,711,339
1915	2,445,664
1916	3,512,996
1917	4,983,340
1918	6,146,617
1919	7,565,446
1920	9,295,252

JAPAN'S RUBBER TRADE—1918-1919

Imports of crude rubber into Kobe in 1913 totalled 1,439,000 pounds, valued $859,000; in 1918 rubber imports increased to 9,616,000 pounds, valued $4,110,000, and in 1919, 15,804,000 pounds were imported, valued at $5,866,000. Exports from Kobe in 1918 included 2,944,000 pounds of tires, valued $2,019,000, and other rubber manufactures to the value of $366,000; in 1919 tire exports were 4,211,000 pounds, valued $3,089,000, and exports of other rubber manufactures increased to $682,000. Exports of insulated wire totalled 2,225,000 pounds, valued $909,000 in 1919, as against 1,892,000 pounds, valued $701,000 in 1918, and 31,000 pounds, valued $9,000, in 1913.

Insulated wire was also exported from Osaka, in the quantity of 4,706,000 pounds, valued $1,188,000, in 1919, as against 2,967,000 pounds, valued $958,000, in 1918, and 136,000 pounds, valued $28,000, in 1913. Imports from the United States into Osaka in 1919 included 30,000 pounds of soft rubber, valued $20,000, as against 32,000 pounds, valued $32,000, in 1918. Declared exports from Japan to the United States in 1919 included 2,402,694 pounds of crude rubber, valued $1,094,085, and 1,036,802 pounds of sheet rubber, valued $442,790.

IMPORTS OF RUBBER GOODS THROUGH THE PORT OF TRONDHEJM, Norway, during 1919, were 23 metric tons, as against 25 metric tons in 1913.

[1]Operating Cost Record of 65 Motor Vehicles in the Los Angeles Water Department, Engineering Record, June 3, 1916, pages 728-732.

Artificial Lighting in the Rubber Industry—III[1]

The Fundamental Principles of Illumination (Psychophysical)

By E. Leavenworth Elliott

WHAT IS PSYCHOPHYSICS?

IN THE LAST ISSUE we discussed the nature and action of light as a form of energy. The subject was one of physics and mechanics, having to do only with matters external to the human body. We come now to the consideration of what takes place within the body through the action of light.

The performance of the mind constitutes the subject of psychology, and the performance of the body the subject of physiology. The subject which deals with the relation between the action of the mind and the action of the body is called psychophysics. Seeing is the mental result of light acting upon the visual organs, and hence belongs to the science of psychophysics.

The subject of illumination is something like the manufacture of rubber. You have certain substances which you subject to various mechanical processes, all of which are carried out in accordance with the rules established by experience, and then the product of these mechanical manipulations is subjected to a mysterious process which you call "vulcanization," which changes the whole mass of materials into a new body having very different properties from the combination you started with. No matter how good your materials, and how perfectly the mechanical operations have been performed, unless the vulcanization takes place properly the final result is a failure. What happens during this process? Nobody knows. To be sure, you have names for all that you can find out about it; you talk of "polymerization," and "rearrangement of atoms in the molecule," but what do you *know* about atoms and molecules? So, we know how to manipulate heat, electricity, and various materials to produce light, and we can direct and modify the light to make it serve our purposes of seeing. But it is what takes place after the light enters the eye that produces the results we are after; the process of seeing is the all-important thing, and this is a far greater mystery than vulcanization. However, you know the conditions required for good vulcanizing without knowing what actually takes place, and we can likewise learn much about the conditions for good seeing without understanding fully just how the eye does it. But the better we understand the construction and working of the eye the better able we shall be to provide the conditions requisite to its efficient operation.

THE EYE AS AN OPTICAL INSTRUMENT

The idea generally conveyed when the eye is mentioned includes all the organs of vision, of which the eye proper, or eyeball, is only a part. Let us examine this visual mechanism in detail. Anatomists tell us that it consists of three main organs: the eye-ball, the optic portions of the brain, and the nerve-cable connecting these.

It is customary to describe the eye (eye-ball) as a small camera, and this comparison is good as far as it goes; but the eye is much more than a camera—it is a whole photographic laboratory. However, the similarity between the visual and photographic processes as a whole is so remarkably complete that it furnishes one of the best methods of explaining vision.

To begin with, the eye is a double mechanism, and hence is a stereoscopic camera. This binocular vision (seeing the same thing with two eyes) is of great assistance in enabling us to judge the relative distances of objects, just as the stereoscope brings out distance in the views seen through it. As an optical apparatus, the eye is exactly similar to the camera. The illustration Fig. 1 represents a section through the eye. The familiar term eye-ball is exact; the eye is a ball, or sphere, bulging slightly in the front. This ball fits a socket in the skull, in which it is free to move to a certain extent in any direction. Six muscles attached to the outer surface and around the front of the ball hold it in place and also turn it in its socket; it is thus like a camera mounted on its tripod with a ball-and-socket joint. The outside casing of the ball is a tough, fibrous substance, called the *sclerotic S*. On the front this coating is transparent and horn-like, and is called the *cornea C*. The cornea bulges out in the form of a portion of a smaller sphere, and forms part of the compound lens with which the eye is fitted, the other elements of the combination being the *crystalline lens*

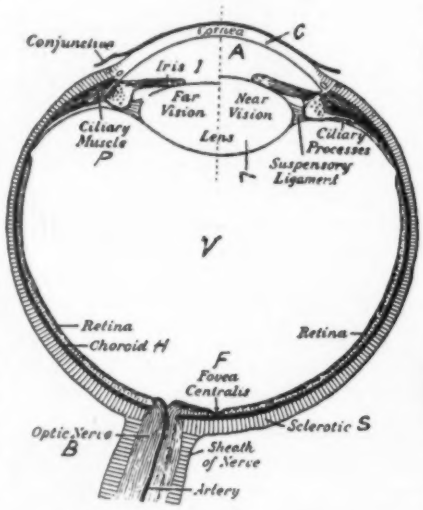


FIG. 1. A DIAGRAM OF THE EYE

FIG. 2. IMAGE ON THE RETINA—FULL SIZE

L which is a double convex lens of a solid, transparent substance, and the transparent liquid called the *aqueous humor A*, filling the space between the lens and cornea. Between these two there is also a membrane having a circular opening, called the *iris I*, which forms the diaphragm or "stop" of the lens. The iris is the central round spot which gives the characteristic color to the eyes, and the circular opening is called the "pupil."

The aperture in the iris is capable of opening and closing through a range of about four times the minimum, which it does automatically, and for exactly the same purposes as the size of stop is varied in the camera; that is, it opens in dim light to admit more light, and it closes slightly when the lens is focussed on near objects, which increases the sharpness of the image. It is commonly supposed that the dazzling effect of going from a dark room into a very light room is due to the excessive amount of light that enters the eye through the full opening in the iris, and that this dazzling effect disappears when the iris has had time to contract. This is only a part, and the smaller part, of the explanation; the principal cause of this effect will be explained later.

The sclerotic, or outer casing, is lined with a thin, dense, dark-colored membrane called the *choroid H*, which excludes all light from the interior except what passes through the lens and iris. This serves the same purpose in the eye as the black paint inside the camera.

The lens is "mounted" in a ring of muscles, called the *ciliary processes P*, which focus the image by contracting or relaxing,

[1]Continued from THE INDIA RUBBER WORLD, February 1, 1921, pages 329-332.

thereby causing the lens, which is elastic, to become more or less convex, and thus varying its focal length. In this respect the eye differs from the camera in which the focussing is done by moving the lens back and forth.

The inner surface of the eye, extending from the muscular lens-mounting over the rear portion, is covered with a layer of tissue consisting largely of nerve fibers, and is called the *retina R*. A bundle of nerves—very like a large cable containing hundreds of telephone wires—enters the eye-ball at the rear, and slightly to one side *B*. These nerves spread out in all directions over the inner surface, which is also well supplied with blood vessels. The portion of the retina directly back of the lens, upon which the image formed by the lens is received, is fitted with the special devices that are directly acted upon by light. These are of two kinds: small rods which project from the surface, like the nap on velvet, and shorter cone-shaped projections, pointing outward. The central part of this sensitive surface is covered with cones only and the outer portion with rods only, the two being interspersed in the median portion. These rods and cones are the terminals of nerves. In the very center of this sensitive surface there is a small spot, slightly depressed, and of yellow color, called the *fovea F*, which is more highly sensitive than the other parts of the surface, and upon which the eye automatically throws the image of what we want to see with particular sharpness.

This sensitive portion of the retina is the counterpart of the sensitive coating of the plate or film in photography. The cones alone give the sensations we call colors; while the rods alone produce vision in very dim light, but give only sensations of varying shades of gray. Who would have looked for so intricate an explanation of the old saying that "in the night all cats are gray"! A little space where the nerve-cable enters the eye is wholly insensitive to light, and forms the *blind spot*. Just what action the light produces upon the rods and cones of the retina which causes them to send nerve currents to the brain is not known—another similarity to photography, the action of light upon the silver salts in the film not being positively known. It had been observed that, left in darkness or dim light, the rods become purple at the ends, and that this purple rapidly fades out on exposure to bright light. This indicates chemical action, but further than this there is no definite knowledge.

All of the effects of light which make up the sensation of seeing are transmitted through the nerve-cable, or *optic nerve*, to their special center—like a telephone "central"—in the brain. The brain, like the eye, is a double apparatus, consisting of duplicate right and left portions. It is a rather curious fact that the optic nerves cross, the nerve from the right eye going to the left lobe of the brain, and vice versa. If the optic nerve is incapacitated, vision of course is prevented. Wood alcohol, taken into the system either by drinking or by sufficient inhalation, has the peculiar property of permanently paralyzing the optic nerve, and so producing blindness—which renders it rather objectional for beverage purposes.

The interior cavity of the eye back of the lens is filled with a transparent substance of buttery consistency called the *vitreous humor V*, which serves to keep the casings distended and the form full and true.

The skin of the face is slit and folded under in front of the eye-sockets, forming the eyelids, which serve as the shutter for the camera. It is important to remember, however, that the eyelids are not opaque, like the shutter in the photographic camera, but decidedly translucent, as may be readily seen by closing them in the light and observing the very sensible impression of light still produced upon the mind.

GENERAL CONDITIONS FOR GOOD VISION

Having made ourselves familiar with the general construction of our seeing apparatus, we may now inquire into the conditions necessary for obtaining the best results from its use. To this end we can still follow the analogy of the photographic camera and process to advantage. What are the conditions requisite to a good photograph? What are the causes of defects in photos? Since photography is now so generally understood it will be permissible to follow this lead in our efforts to explain the general principles of lighting.

To get a good picture you must first of all have a good lens. By no possibility can the finished photo be any better than the image thrown on the plate: poor plates, or poor developer, or wrong exposure may make it worse. The character of the image is determined solely by the lens. The lens of the eye is frequently defective—after middle life, nearly aways so. The cornea often becomes distorted in shape, taking an elliptical instead of a true spherical form, which prevents focussing sharply on horizontal and vertical lines at the same time. This is called astigmatism, and is corrected by the use of glasses having a cylindrical surface. After middle age the lenses generally lose their elasticity to such an extent that they cannot be focussed on near objects, thus becoming far-sighted. This is corrected by using glasses having a slight magnifying power, i. e., having slightly convex surfaces. Sometimes the lens has too great a curvature, producing near-sightedness, which is corrected with concave, or reducing, glasses. Not infrequently the two eyes have different focal lengths, or different-shaped corneas, and must be matched optically by the use of different glasses for the two eyes. All defects due to deformation of the lenses of the eye can be corrected by the use of glasses; the crystalline lens may even be removed, and its action performed by an exterior glass lens, as is done in cases of cataract.

PICTURE ON THE RETINA IS WHAT WE ACTUALLY SEE

As the image on the plate determines the character of the photo, so the image on the retina determines the character of the visual impression. In fact, the retinal image is the only thing that we actually *see;* all of our *perception* of things by means of vision is the result of experience. We know that the objects we see are in their places because we have learned to connect our visual impressions with other sensations, particularly of muscular movement and touch. Anything that changes the image on the retina from its usual form will mislead the mind as to the reality, as in the case of the mirage. A dog, seeing the image of itself in a mirror, believes it sees another dog; a man who had never before seen a mirror would make the same mistake. We can also see things with the eyes shut—the familiar "after images."

In speaking of the eye as a camera we naturally overestimate its size. In this respect the eye should be compared to the microscope camera. The whole apparatus is only an inch in diameter, and the actual size of the image and the extent of the field is shown in Fig. 2. The diminutive circle in the center shows the part of the image falling on the fovea, which is seen sharply. The conscious effort which we make to look sharply at an object is expended in turning the eyes so as to bring the images of the object on the foveas—called fixation—and in bringing the lenses to the curvature necessary to produce a sharp or focussed image.

The impression we have of seeing about us within a wide field is due to the fact that the eye-ball is naturally in constant motion, of which we are as little conscious as of winking, and the different views are blended in the mind by memory. So habitual is this motion of the eye-ball that it can be overcome only by a severe conscious effort, which soon becomes irksome, and then painful, like holding the arm outstretched. Try looking sharply and steadily at a single word on this page, and you will soon appreciate this fact. In this constant roving the eye instinctively tends to bring the most prominent, i. e., the brightest point, into focus on the fovea—a fact which will receive attention later in connection with glare. Our little micrographic camera is thus a panoramic camera—the kind that swings on its tripod

while the picture is being taken, only the eye turns in all directions instead of merely swinging around.

WHAT HAPPENS WHEN WE SEE

The formation of the picture on the retina is a simple matter of the mechanics of light; but the process of *seeing* this picture, that is, of realizing it in consciousness, is intricate beyond comprehension. Consider that there are two pictures taken from slightly different positions and consequently different in perspective; that the pictures are bottom side up and reversed right and left; that they are of microscopic fineness; that they have all variations of color as well as of light and shade; that they are constantly changing with instantaneous swiftness, and that objects in them are frequently in motion: all of this complex, the visual apparatus in the brain transforms into the single, congruous impression of objects having their actual relative sizes, shapes, motions and positions in space. Furthermore, this transformation does not take place where the picture is produced, but the image is first converted into nerve currents—whatever they may be—and transmitted to the brain through cables of nerve-fibers. If we follow the analogy of photography to the whole visual apparatus, we must imagine a tiny camera an inch long, with the sensitive plate connected by a telegraphic cable directly to a moving picture projector, which gives a life-size picture in colors of whatever the camera "shoots." Science has some distance to go yet before it can equal this "stunt"!

But to return to the retinal image as the determining factor in vision. We have seen that mechanical defects in the lens of the eye can be remedied by the use of glasses; but there is one imperfection in the lens of the eye which is inherent and impossible of correction by artificial means. The nature of this defect is easy enough to understand. If you look at an object through a simple magnifying glass you will notice a play of rainbow colors about the sharp edges and lines of the object. This results from the fact that a simple convex lens cannot bring the different colors to a focus on the same surface; if the yellow is in focus, the red focus will be back of the surface, and the blue focus in front. This is called *chromatic aberration*. By combining lenses of different kinds of glass it is possible to overcome this difficulty almost entirely. Such a compound lens is said to be *achromatic*. The lens of the eye is *not* achromatic. The retinal image is therefore subject to chromatic aberration. A perfectly sharp image is formed only when objects are seen by light of one color, or monochromatic light. The more nearly light approaches this quality the sharper the retinal image of objects seen by it.

SHARPNESS OF VISION DEPENDS UPON COLOR OF LIGHT

Before the invention of the mercury-vapor lamp the chromatic aberration of the eye had no practical application to the use of light for general illumination. All other light-sources, as we have before mentioned, have full, continuous spectra, i. e., contain all the colors, and the only way to obtain monochromatic light from them is to absorb all the colors except the one desired, which was far too wasteful a process to be seriously considered. In fact, the great object sought in the improvement of artificial light was to get it as nearly white as possible, i. e., of the same color as full daylight.

When the mercury vapor lamp was first offered to the public the distinct color of its light was generally considered a fatal objection to its use for any purpose except photography, in which its usefulness was at once recognized. It was some years before the fact that the light, on account of its nearly monochromatic character, produced a sharpness of vision quite unobtainable with other artificial light, or even with sunlight. The very manifest advantage of this increase in visual acuity in the case of industrial lighting gradually overcame the objection arising from its unfamiliar, sometimes startling, color effects, and finally placed it in a class by itself as a light to work by.

The retina resembles the photographic plate in being sensitive to different degrees for the different colors, but differs from the plate in the order of its sensibility. The rays which produce the greatest effect upon the visual organs are in the middle of the spectrum—the yellow and yellow-green, while the rays that have the greatest photographic effect are in the extreme blue end and the invisible rays of still shorter wave-length, called the ultra-violet, or actinic rays. The relative brightness of the different parts of the spectrum is indicated in the curves that are shown in Fig. 3. Mercury-vapor light is peculiar in having the largest part of its rays in the most luminous part of the visible spectrum. The different lines of the mercury-vapor spectrum are shown by the heavy lines in the curve. This accounts for the high mechanical efficiency of the mercury-vapor lamp.

It may be well to explain the above curve by reference to the mechanics of wave motion, with which we started. It was stated that the mental sensation of brightness depends upon the energy of the light-waves. This is true with reference to any particular wave-length (color), but different wave-lengths do not produce the same effects of brightness with the same amounts of energy. Red and violet waves having the same amounts of

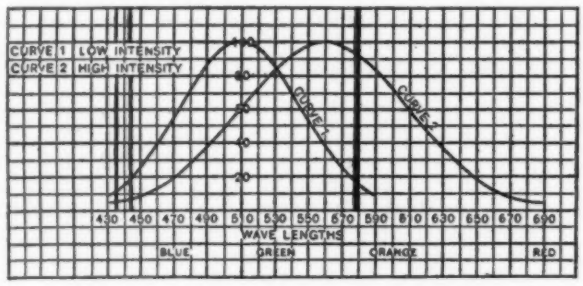


FIG. 3. CURVES SHOWING THE RELATIVE BRIGHTNESS OF DIFFERENT COLORS FOR EQUAL AMOUNT OF ENERGY

energy, or physical intensity, produce a very feeble visual effect, or brightness, compared to yellow and green waves having the same energy. The relative degree of brightness of the different colors for equal amounts of energy are what the curve represents.

APPEARANCE OF COLORS DOES NOT FOLLOW PHYSICAL VARIATION IN LIGHT

The psychological sensations of color do not closely follow the physical variations in the light-waves. The *quality* of color changes with its brightness, all colors fading into a bluish gray at very low intensities. If you look at a sample card of different colored fabrics arranged in spectral order—red, orange, yellow, green, blue and violet—under a fairly high illumination by sun light, they all show their characteristic color values. If, now, the intensity of the illumination be gradually reduced, the colors will presently begin to change their tone, as well as their brightness; the lightest part of the color-band will move from the yellow to the green, while the red and orange will become darker, and the blue and violet lighter, i. e., fainter. As the intensity decreases further the colors on each side of the green become less distinct, until they become quite invisible, leaving only the green, which finally gives way to the neutral gray, the color of all things, as well as cats, in the dark. This change of color with change of illumination is called the Purkinje effect, from the name (pronounced Poor-keen'-ye) of the Austrian who first observed it.

This peculiar psychological phenomenon enters into the general problem of industrial lighting in a very practical way. The important part is this: green light suffices to produce distinct vision at lower intensities than light of any other color. One of the greatest—probably *the* greatest—defects in artificial lighting as compared to daylight is the darkness of the shadows. Even in a large room with only side windows, it is comparatively easy to see in the darkest shadows, as under benches, tables, etc.; while

the same room, abundantly supplied with incandescent lamps and reflectors, will have shadows of obscure darkness in all these places. The large portion of green rays in mercury-vapor light results in the practical elimination of obscure shadows, so that a room illuminated with the proper general intensity by mercury-vapor lamps is as free from objectionable shadows as it is in full daylight.

The writer recently had an opportunity of putting this statement to a public test. A meeting, mostly of manufacturers, was being held in a fairly large hall in which there was a well-arranged installation of mercury-vapor lamps. A number of pieces of machinery were in the room for exhibition purposes, besides various tables and other objects. Those present were requested to find a place anywhere in the room in which 8-point type (the size of print on this page) could not be easily read. No such place could be found, though the deepest shadows directly underneath the tables, machines and other objects were diligently tried. There is no doubt about the fact, and it is just what the psychologist would expect as a result of the "Purkinje effect." It is the comparatively high visual power of green light at low intensities that "does the trick."

COLOR NOT ESSENTIAL TO VISION FOR PRACTICAL PURPOSES

Color is not an essential element of vision; but is simply ornamental. Many people are partially, and a few wholly color-blind; and yet they hardly appreciate the defect in their vision, and suffer no practical inconvenience. Evolutionists tell us that color vision is a rather recent acquirement, and that our prehistoric ancestors had no sense of color but saw only differences in light and shade. In industrial lighting, even in those branches in which color forms a part of the art, as in textiles, the color of the light is of surprisingly little practical importance. Aside from the purely artistic handling of color, which is always done by daylight, and which is entirely distinct from the mechanical manipulation of the colored materials, there is no occasion for the workman to concern himself with color, except possibly to distinguish one material from another in some cases; and then the apparent colors are of no consequence, but only their differences. The shifting of the color scale by a colored light, such as that of the mercury-vapor lamp, is therefore of very little practical account in the industries. There are not a few cases in which the exaggeration of difference between certain shades or colors is of very material assistance.

WHAT IS GLARE?

A familiar defect in a photograph is that known as halation, which results from some part of the field being very much brighter than the rest of it, as a window in an interior. Our eye-camera is subject to the same difficulty; but in vision we call it *glare*. With the possible exception of the darkness of shadows previously mentioned, glare is the most serious defect in artificial lighting. As might be expected, glare has been more talked of and written about than any other problem in the whole subject of illumination. Also, quite naturally, there has been much darkening of counsel with words without knowledge, not to mention some pure faking. The importance of the subject demands that we give it careful consideration. The analogy of the photograph will still be helpful.

Let us first distinguish between *glare* and *dazzle: glare is the result of excessive contrast in brightness between different parts of the visual field;* dazzling is the effect of light of such high intensity falling upon the retina that it produces an immediate sensation of pain, or acute discomfort. A dazzling light in the field of view will always produce glare, but not all glare is dazzling. The *effect* of the excessive contrast on the visual picture is the same as it is in the photograph; the bright spot becomes a patch of white fog, and the rest a shadowy mass with few details distinguishable. Photographically, the bright spot is fogged by overexposure, while the other part is dark and lacking in detail from underexposure. The action in the eye is very similar. So far as the result is concerned, the "exposure" in photography depends upon the rapidity of the plate and the size of the stop, as well as upon the time. In the eye the time cannot be varied, but the other two factors can. The iris can contract so as to reduce the amount of light to about one-fourth that entering at full opening. The regulation of the sensitivity, or rapidity, of the retina is a far more complicated process. The eye-camera is furnished with two different sensitive plates, one orthochromatic, i. e., sensitive to all colors, but comparatively "slow," and the other a very "rapid" plate, but incapable of giving color distinctions. The former occupies the center of the retina, and the latter the surrounding surface, the two blending into each other. Referring back to the description of the eye, we may call the slow, orthochromatic plate the "cone plate," and the surrounding, rapid plate the "rod plate." In bright light the rod plate becomes insensitive, and ceases to act, leaving the production of vision entirely to the cone plate. In very dim light the cone plate loses its power of action, and vision is produced entirely by the rod plate. The substitution of one plate for the other with the change from bright to dim light takes place slowly, requiring as much as a half-hour in extreme cases. This is called *adaptation*. The glare produced in going suddenly from a dark to a very light room is due to the excessive overexposure on the rod plate before it can adapt or non-sensitize itself. The effect is increased by the eye receiving the maximum light through the full opening of the iris. The adjustment of the iris, however, takes place comparatively rapidly, within a fraction of a minute. On going suddenly from light to darkness the eye sees nothing until the rod plate can resensitize itself.

EFFECTS OF GLARE

Now, what happens when one part of the visual field is very light as compared with the rest? The retina is confronted with the problem of doing two things at once that are of contrary nature; the bright spot is too bright for the rod plate, and the rest of the field, by comparison, too dim for the cone plate. As a result, neither is done well and strain or nervous tension is the result—the imperfect vision and ocular discomfort that result from glare.

There is another condition that undoubtedly serves to aggravate the results just described. We have previously stated that the eye naturally seeks out the most prominent point in the field, and focusses it on the center of the retina. It therefore requires an extra effort to keep any other point in the field focussed for sharp vision. Again, if there are a number of bright points in the field, as in the case of a room lighted with units in each bay, the attempt to focus them all at once leads to conflicting efforts, which must result in muscular strain and nervous discomfort.

Although the conditions producing the effects that are collectively ascribed to glare are by no means fully understood, the following seem to be fairly established facts:

Glare is due to excessive contrast in different parts of the visual field. According to the best information experimentally obtained, the bright spot must be 1,700 times the cube root of the brightness of the general field in order to be glaring. The mathematical formula is less important than the simple fact that it is contrast rather than the actual brightness of the offending spot that produces glare. As proof of this the familiar fact may be cited that a bare electric lamp is exceedingly glaring in an otherwise dark room, but in open daylight is hardly distinguishable.

Glare increases with the *quantity* of light entering the eye, as well as with its brightness.

Glare decreases with the *size* of the bright spot, and disappears entirely if the spot becomes a visual point. Distant street lamps furnish an example of this fact.

Glare is said to cease when the bright spot is more than 26 degrees from the axis of vision.

Glare may be caused by direct reflection from shiny surfaces, as well as by direct rays from light-sources.

SCATTERED LIGHT IN THE EYE

Let us once more return to our photographic analogy. If the camera bellows leaks light a foggy negative is the result. Scattered light in the eye interferes with clear vision also. This trouble is often confused with glare. The shutter of the eye-camera, the eyelid, is very different from the photo camera shutter, as we have before remarked, in being highly translucent, and thereby admitting a considerable volume of diffused light when closed. It is as if the camera shutter were made of ground glass. Light-sources anywhere in front of the eye therefore produce some extraneous light within, regardless of the direction in which eye is looking.

The final object of industrial lighting is to facilitate labor. The individual capacity for performing any given labor depends upon skill, which may be defined as the ability to coordinate muscular movement with the mental processes of perception and judgment; to a certain degree upon muscular strength; upon what the psychologist calls the "attitude," and upon the state of fatigue, muscular and mental. The most efficient lighting is therefore the kind that affords the quickest and clearest perception, and produces the least muscular and mental fatigue. The subject of fatigue as related to illumination is mostly unexplored territory as yet. There has been much loose talk about "eye strain," as there has about "glare"—the two bugbears of "illuminating engineering." Eye strain is *muscular* strain, and has nothing to do with retinal fatigue. There are two important sets of muscles connected with the eyes, one that does the focussing, and the other that keeps the two eyes so aimed that the stereoscopic effect, i. e., binocular vision, is produced. When these are overworked, more or less serious results follow, ranging all the way from slight discomfort to nervous indigestion, and insanity. Optical defects uncorrected by glasses are the most common and serious in results; but defects in illumination may produce marked discomfort. Optical defects in the eye, uncorrected by glasses, are the most common cause of this complaint. The growing practice of industrial establishments of maintaining a regular optical department, and examining and prescribing for the eyes of all employes, is not a piece of philanthropy, but a most profitable business investment like a good lighting installation. That lighting conditions which interfere with the normal action of the visual organs induce a degree of general fatigue that plainly reduces the output of labor, there is ample proof; the exact scientific relation of cause and effect needs much further experimental research to reduce it to definite laws.

SUMMARY

The organs of vision consist of the eye (eye-ball), the optic nerve, connecting the eye with the brain, and certain portions of the brain in which the effects of light are translated into sensations of vision. The mutual actions of these organs belong to the science of psychophysics.

The eye is an optical instrument similar to a photographic camera, consisting of lens, stop, shutter, dark-box, and sensitive film. The lens forms an image on the sensitive film (retina).

The image on the retina is "developed" into the sensation we call "seeing" by a mental process in the brain.

The retinal image is the thing we actually see; and vision can be no clearer than this image.

The lens of the eye is incapable of focussing different colors sharply at the same time, i. e., is not an achromatic lens. It can therefore produce a perfectly sharp image only by light of one color (monochromatic light). The nearer light comes to this quality the sharper the image.

Mercury-vapor light is the only light in commercial use that is approximately monochromatic, and hence gives greater acuity, or sharpness, of vision than ordinary light.

The retina, or sensitive film of the eye, has two kinds of sensitive surface, one that sees colors and gives sharp vision, the other that does not give colors but is used for seeing in dim light. It requires a period of time up to a half-hour for the eye to adjust itself for differences of light from very bright to very dim.

The eye can see by green light of much lower intensity than with any other or all colors.

Glare is the effect of discomfort and blurred vision resulting from excessive contrast in brightness between different parts of the field. It increases with the quantity of light entering the eye and diminishes with the size of the bright spot. It is greatest when the bright spot is looked at directly and is said to cease when the spot is at an angle of more than 26 degrees from the axis of vision.

Scattered light within the eye interferes with clear vision and may result from bright light-sources anywhere in the field.

Eye strain is the result of overtaxing the muscles of accommodation (focussing) and the muscles of fixation (those which hold the eye in position to see the desired object).

In the next issue we shall take up the application of the theory to practical cases of lighting in rubber factories.

RUBBER TRADE INQUIRIES

THE inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The Editor is therefore glad to have those interested communicate with him.

(847) A reader asks for the addresses of manufacturers of the following: Rubber plugs for pencil tip erasers; metal sleeves to hold plugs; machine for clamping on metal sleeves.

(848) A manufacturer requests the name of the manufacturer of the rubber substitute known as "Rubberaid."

(849) An inquiry has been received for "rubber glass," a wire mesh covered with several thicknesses of rubber, used extensively by mining companies.

(850) A concern with salesmen calling on the drug and hardware stores, having 15,000 dealers handling its nationally advertised product, desires to secure the selling rights or manufacturing and selling rights on an additional meritorious specialty that can be merchandised to the drug and hardware trade, preferably on a royalty basis.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS

Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from the following district or cooperative offices. Requests for each address should be on a separate sheet, and state number.

DISTRICT OFFICES.

New York: 734 Customhouse.
Boston: 1801 Customhouse.
Chicago: 504 Federal Building.
St. Louis: 402 Third National Bank Building.
New Orleans: 1020 Hibernia Bank Building.
San Francisco: 307 Customhouse.
Seattle: 848 Henry Building.

COOPERATIVE OFFICES.

Cleveland: Chamber of Commerce.
Cincinnati: Chamber of Commerce; General Freight Agent, Southern Railway, 96 Ingalls Building.
Dayton, Ohio: Dayton Chamber of Commerce.
Los Angeles: Chamber of Commerce.
Philadelphia: Chamber of Commerce.
Portland, Oregon: Chamber of Commerce.

(34,367) A commercial agent in Egypt is planning to open show rooms for the exhibition and sale of tractors, trucks, tires, etc., and desires to secure the representation of firms with a view to advertising and selling American goods.

(34,409) A commercial agency in Ceylon desires to secure the representation of manufacturers for the sale of insulated wire.

(34,433) A mercantile company in the Straits Settlements desires to secure an agency for the purchase of rubber.

Substitutes for Rubber Tires

The following shows German interest in almost any possible substitute for the rubber pneumatic tire. Forced to do without rubber during the war, the belief persists that solids or semi-solids made of an infinite variety of compounds may still be successfully used. The article is by Diplom. Engineer Jahr, Berlin-Lichterfelde, and appeared in "Kunststoffe."

THE bristle tires which have come to notice recently were in the market more than twenty years ago and mostly in the form of cushion tires. Fig. 1 represents a tire patented in 1896 in England, the bristles of which are set in a base of wood, caoutchouc or other material *b*, which is mounted on the concave wheel rim *f* to increase the elasticity. According to an American patent the bristle tufts *a* are closed in rubber *k* and are united by vulcanization, Fig. 2. A German patent provides a cover of steel rods upon a suitable base which is embedded in an elastic ring to ease the pressure. Fig. 3 shows a more modern way of securing the bristle tufts *a*. These are wound around a bolt *q*, which is fastened in the rim. Other known examples of the same principle are those where the bristle tufts are wound around rings running parallel to the base of the tire, Fig. 4; and another one which is shown in Fig. 5. The strong tufts of wire are connected in groups by wire fastenings screwed down below the rim and the lowest layers of the wire bristles are connected by short wire fastenings *d* in Fig. 6. An example of a cushion tire is given in Fig. 7. The casing is filled with a coil of bristles *a*, which are fastened to a spiral wire center. To give more resiliency to the bristles the vacuum between the bristles is filled with a light elastic material, preferably the pith of plants. The filling of this material is effected while the bristle coil is covered with a light cover of linen to prevent the filling falling out.

FIBER TIRES

The principal material for these tires, which are mostly made in the United States and England, is fiber of all kinds in the unspun state. Plant, mineral or animal fiber can be used. Preeminently coconut fibers, jute, kapok, ramie and manila hemp are in use. Lacking these, straw, turf and other materials can be employed. The fiber is either wound around the rim or placed in layers upon it. Or they are put perpendicularly upon it, which is the newer method. The elasticity of the tires is increased by alternating the fibers with strips of canvas or linen. It has also been found useful to separate the individual layers with metal strips or rings, which, incidentally, will aid in fastening the tire to the rim. The fiber may be arranged also in upright tufts or rows and set in a bed of caoutchouc. Or the whole may be connected by enclosing it in a bed of tar, asphalt or resin until it forms a complete tire, which is supported by rings. To make the tires still stronger they have been subjected later to strong pressure and sewed together with string. In the case of a new English method the fiber bristles are treated with a rubber solution and placed upright side by side. The fiber then is cut to measure and vulcanized. This tire is made stronger by interlacing it with strips of material made out of coconut fiber or any other similar material. The space between the fiber and the strips of material, which are also placed upright, is filled with tar, balata, gutta percha, resin or any similar material and the whole is subjected to hydraulic pressure. A U-shaped rim is generally used for this kind of tires.

VARIOUS EXAMPLES OF FIBER TIRES

Fig. 8 demonstrates a fiber tire of American make. The tufts of manila hemp *f* are placed upright upon the rim, and impregnated with tar, asphalt or resin and subjected to high pressure that produces a compact tire body which can still be sewed together if necessary. This tire is fixed upon the wheel by annular rings which grip over the sides of the rim. Fig. 9 shows a tire with metal protection, the fiber layers *f* of which are made of braided hemp and pressed between strong bands of metal, *m*. The metal protection may be part of the rim. In this case the fibrous material is inserted between the metal strips as shown in Fig. 10.

CORD TIRES

The material used for this kind of tires as a rule is hemp, as it gives the most strength and resistance. A substitute is raffia. There is, however, little known about the practical use of this tire. The hemp or any other material is spun into yarn, which in turn is made into a strong cord. For the manufacture of the tire several cords are required which are placed upon the rim, side by side or cabled around each other. In some cases the cord is wound around a hollow tube. Five or six cords also may be used as a filling for an ordinary tire cover. Protection has to be given the cords against stretching and deterioration. The resistance of these tires can be increased by impregnation or by any other similar protection.

EXAMPLES OF CONSTRUCTION

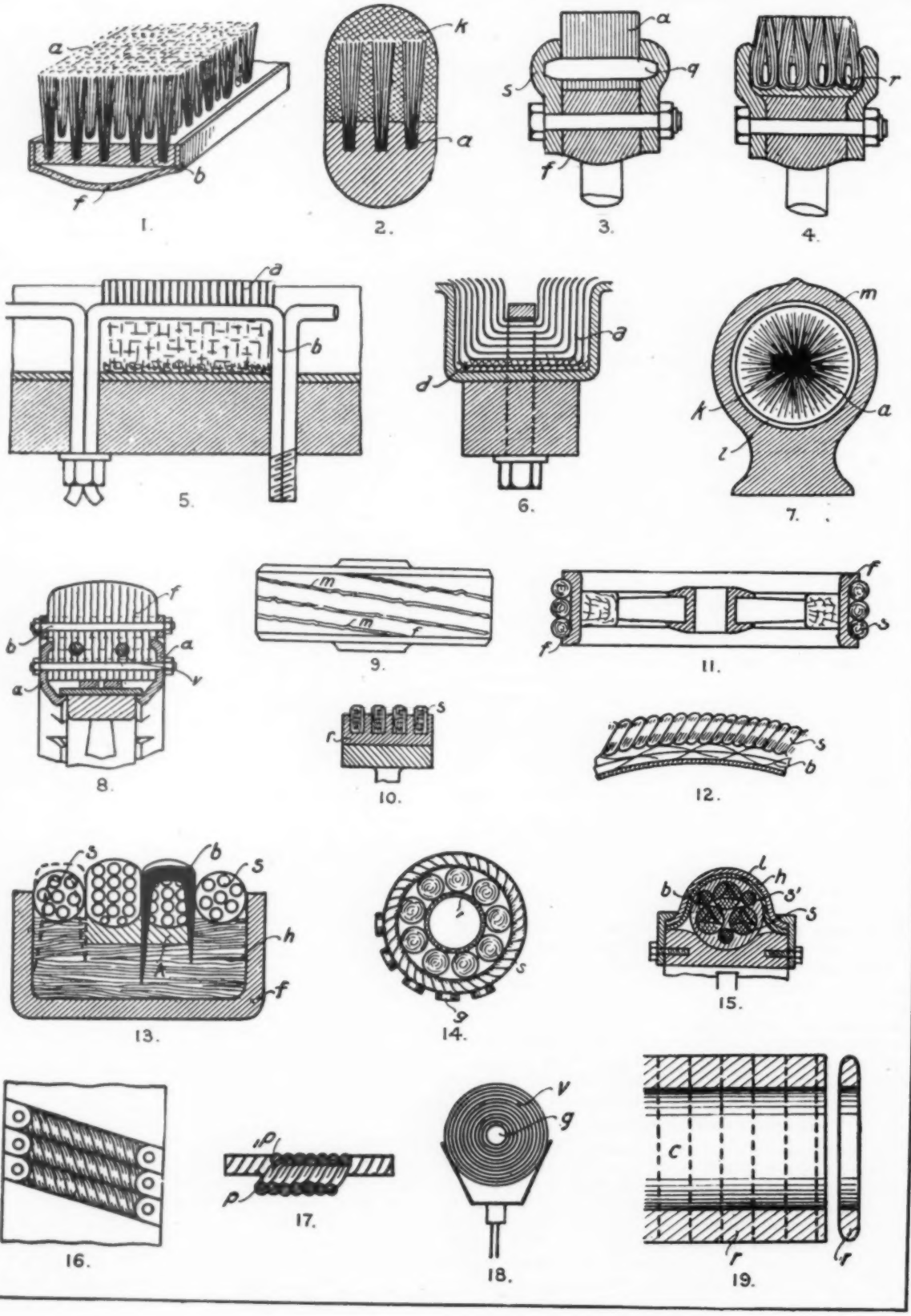
A comparatively simple cord tire is shown in Fig. 11. The cord *s* is fastened on the rim *f* and carried around it. The other end of the cord is stretched by a chain or spring pulling device which insures the cord being tight. No less simple is the construction shown in Fig. 13. A wooden tire foundation *h* is placed in the U-rim *f*. The ropes *s* are then placed upon the wooden tire, the surface of which is provided with a profile for that purpose. The ropes *s* are packed tightly beside each other and connected by hooks and hoops *b* or by means of screws and plates to prevent the slipping of the outside ropes. To produce greater elasticity, the center of the wooden tire *h* can be fitted with a flat caoutchouc tire. To keep the tire surface concentric to the hub springs *b* are inserted between the ropes and the rim which can be adjusted if required, as shown in Fig. 12.

Fig. 14 shows a cord tire with an inner metal tube *r* around which a hemp cord *s* is wound which is covered by another cord. Anti-slipping bolts are fitted upon the second cord, which also may be made of wire. The connection between the ends of the rope is usually made by easily closing connecting links. Fig. 15 shows a similar arrangement where three stronger cords are connected with three thinner ones. The cable obtained in this manner is enclosed in a rubber tube *b* and finally inserted in a cover of leather *l* and another of rubber *h*. Finally a tire may be mentioned where the rim is covered with short pieces of wire cable placed crosswise upon the rim, Fig. 16. To prevent the unwinding of the short pieces of cable the cable ends are welded together with the cable center *p*, Fig 17.

FELT TIRES

Felt is a material produced from animal hair. Not all hair, however, is suitable for the manufacture of felt. The finer the hair the better and more elastic is the felt. As a rule only pure wool felt is used for tire making. The strips of felt are reinforced and impregnated. Care is taken that the inner layers of felt are looser than the outer layer so as to retain a greater degree of elasticity. Felt tires appear in different types. These are: Tires made directly from the raw material during the felting process; tires made from felt rings and felt strips; tires made from felt disks entirely or in connection with leather, rubber, canvas, or other filling materials.

To the first-named group belongs an older felt tire, Fig. 18, where a thin rubber tube *g* is covered with a felt ribbon in succeeding layers. This is done entirely by hand. When one layer is applied the tire is cut to length and the whole is subjected to a new felting process. The two ends of the tire are finally



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19.

connected by means of a shellac or rubber solution. Such a tire is fastened upon the rim by the use of some adhesive material. The inner rubber tube prevents the flattening of the felt layers. Another method, also of earlier date, provides for a felt band of approximately ten inches in width. This band is wound around a rim by means of a revolving table. When the tire has reached the desired thickness the band is cut and the whole is sewed together with woolen thread so that the different layers cannot get out of position. The tire then is subjected to a felting process, after which it is returned to another rim, where it is beaten circular by a hamn.ering process. Still hot, it is put upon a third rim, where it is allowed to dry and cool. The outer layers of the tire are impregnated to harden the tire surface while the inner layers remain soft so as to give the required elasticity.

A new method of making the felt tire, shown in Fig. 19, is the following: A cylinder of felt of the diameter required for covering the rim of the wheel is first made. From this cylinder, rings of the desired thickness are cut. These are fashioned upon a turning lathe and impregnated with a waterproof solution. In another construction by the same method the ring obtained in the above manner is pressed into tire form, when it is impregnated with a waterproofing solution and covered with a surface of oil or paraffine. In every case only the outer thicknesses of the tire are impregnated.

Figs. 20 and 21 show a felt tire in which the individual felt sections *f* are placed side by side and fastened upon wires *r*. This is an American invention. Fig. 22 is of similar character. The felt sections are made of spirally cut strips of felt which are impregnated with a rubber solution. After drying they are placed side by side and compressed by a strong hydraulic pressure. The tire section obtained in this manner is vulcanized and covered with a hardening material. Each section is placed upon a U-rim and fastened by means of a bolt *b'*. If the tire is to be used upon a flat rim, the whole U-rim will have to be fastened upon the felloe which is covered for this purpose with a wooden rim *h*. To prevent the slipping of the U-rim a bolt is inserted through the felloe of the wheel.

Fig. 23 shows a dual tire which is made by laying strips of felt upon each other *f*, *f'* and covering the whole with a leather cover *l*, *l'*. The felt tires are placed upon an iron rim *e*, *e'* which is placed upon the rim base and fastened by bolts *b*. The tire surface is protected by layers of leather and supported by iron or steel bands. The material is wool felt. Another felt-ribbon tire, Fig. 24, is produced by placing a number of layers of felt upon the wheel surface. The felt strips *f* in this case are somewhat wider than the width of the rim and pressure is applied from the side by means of two side rings *r* and a screw-bolt *b* until the width of the tire has been reduced to the width of the rim. An outer iron or steel tire is fastened upon this base, the felt giving elasticity to the structure. The same idea is executed with the aid of two felt tires between which a steel band is introduced to separate the felt strip tires.

An American patent provides for a piece of felt which is cut in the form of an irregular square, Fig. 25. This is pressed into a circular profile, as shown in Fig. 26, which gives stronger pressure to the outer points *a*, *b*, *c*, *d* and leaves the center *k* comparatively soft and elastic. This tire is enclosed in a cover of rubber, leather, canvas or any other suitable material and fastened together on the inner ring. Fig. 27 also shows an inner center of elastic felt which is enclosed in a rubber casing. This casing is vulcanized to the filling material. The ends of the tire are connected as shown in Fig. 28. The rim of this tire is of U-shape, which is bent inward when the tire is fixed upon the rim.

Fig. 29 shows a dual tire also mounted upon a U-rim. The body of this tire consists of blocks of felt *f*, *f'* which are placed close together. To secure the blocks upon the rim two iron rings are pressed sidewise into the felt over the rim as shown in *r*. A rather interesting example is that represented in Fig. 30. This is a composition tire of rubber, cotton and felt. A rubber tube *k'* is inserted into another rubber tube *k*. The inner tube is filled with a center of cotton *b*, while the space between the inner and outer tube is filled with spirally wound layers of felt *a*. The cotton filling is intended to prevent the stretching of the tire so that it will stay upon the rim without any special preparation. T-shaped screw-bolts can be used to fasten the tire. These are inserted through the rim. A new American tire uses thin layers of felt for the body of the tire. These layers are bound together by similar layers made 50 per cent of rubber and 25 per cent of gelatine. The individual layers are vulcanized.

HAIR TIRES

These are mostly tires of the cushion or bolster type or combinations of both. Fig. 31 is a tire of the most simple kind. The hair is tightly fastened into a deeply curved rim. The center of the tire, shown in Fig. 32, consists of closely wound hair which is covered by a rubber cover and fastened upon a base which is also made of caoutchouc. The tire is inserted into a U-shaped rim.

There are several variations of this tire. Thus, the center of the hair covering may be a rubber tube. Or the hair body may be enclosed in a rubber tube.

Fig. 33 represents a cushion tire where the outer casing is made of rubber which is strengthened on the sides *k*. The center is filled with carefully pressed hair. In use this tire will flatten out and its heavier sides then will prevent friction from the rim. More elastic is a tire which contains, besides the rubber cover, a center made of rubber, Fig. 34. This tire contains, besides the rubber filling *k* and the hair cushion *h*, an air space *l*. The various sections are separated by canvas walls and a cover of caoutchouc or leather is provided. The strong rubber block in this tire retains the tire in its proper position and also supports it if the air chamber should be demolished. The same principle is applied in another tire which contains two compartments, one to be filled with air while the other contains a hair cushion. The bases of these tires may be supplied by a metal insert which takes the place of the air cushion.

Combination fillings of hair and cork have been tried in this respect and feather fillings also have been used with varying success.

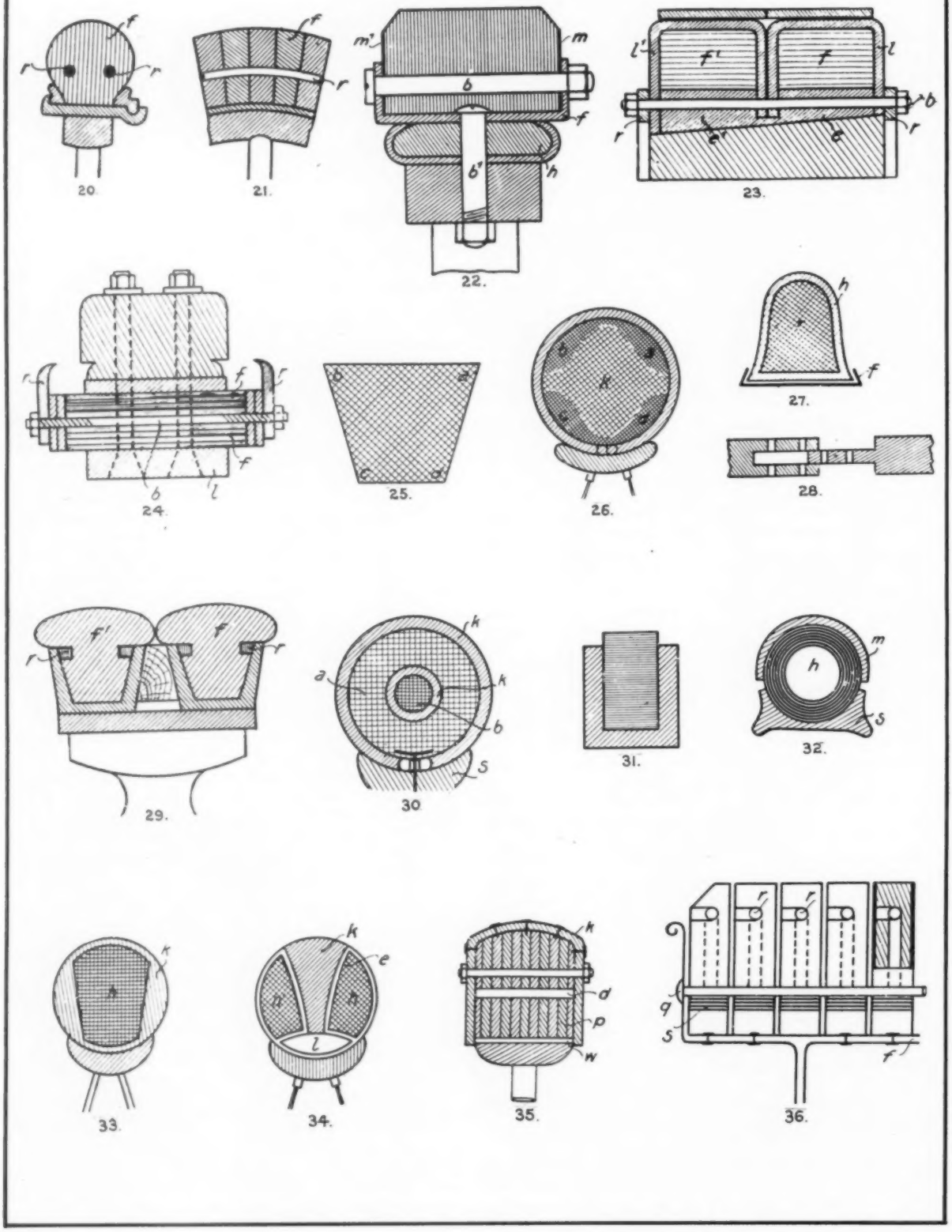
PAPER AND CARDBOARD TIRES

The paper and cardboard tires follow in general principle the felt strip and section type of tire.

Layers of waterproof paper are placed side by side and pressed together by the walls of the rim. The whole is fastened by bolts. Fig. 35 shows such a tire where the body consists of paper layers *p*, connected with each other by a binding material. To prevent the slipping of this tire the rim is provided with corrugations which grip into similar ones in the tire base. The running surface of this tire is made of rubber or leather, *k*.

A French patent, Fig. 36, provides for paper blocks which are connected by tension rings. The whole is placed upon a spiral spring *s* and a solid bolt is inserted from the sides. A section tire is made of very thin layers of paper which are put upon the rim and are connected by pressure or other means. The same may be effected by making blocks out of the individual pieces of paper. The blocks are provided with wavelike incisions which grip into each other.

A paper band tire is that shown in Fig. 37. A band of paper *a* is loosely wound around the rim. The running surface *b* is fastened tightly around the paper, which presses it loosely together and brings about the desired elasticity. A soft binding material is inserted between the various layers of paper. Tar, pitch or resin are especially suitable for this purpose. The softness of the binding material, together with the loose adhesion of the paper layers, gives a great elasticity to this tire, which compares well with that of an all-rubber tire.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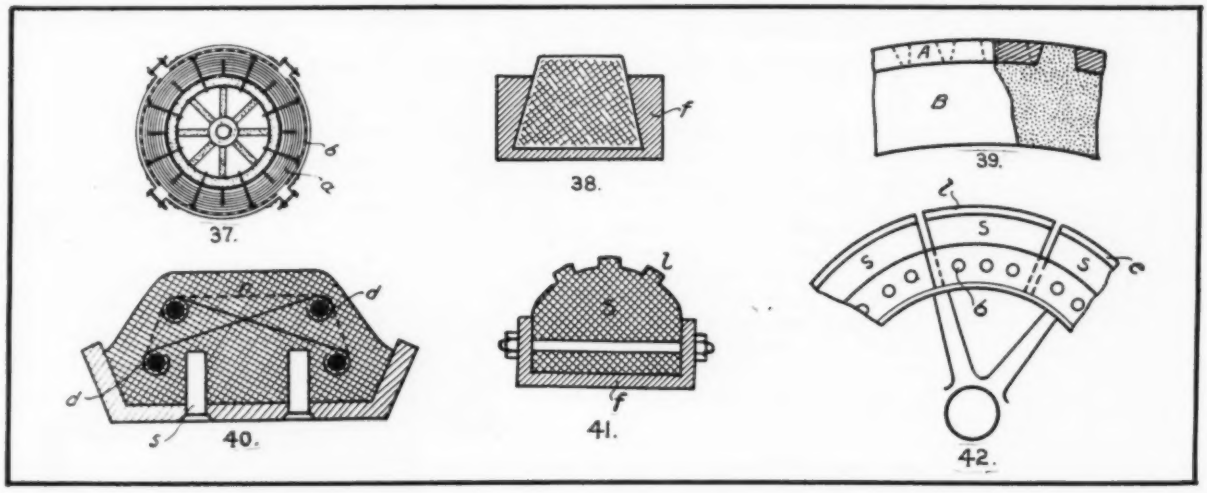


ASPHALT TIRES

Asphalt, bitumen, cellulose, wood pulp and other materials are used. An American method, which is also patented in Germany, provides for the filling of a heavy U-shaped rim with asphalt. While inserting the material in the rim, sand, corundum, iron filings and other hardening fillings are added to the mixture to make the tire harder in its outer parts, Fig. 38. An English patent provides for a filling of 30 per cent sawdust, 25 per cent oxide of magnesia, 10 per cent corn flour, and 35 per cent chloride of magnesia. This mixture *B*, in Fig. 39, is filled in the rim and covered with an iron tire *A* which is perforated at intervals. Fig. 40 is a reinforced concrete tire, the frame of which is made of four wire rings *d* covered by a wire mesh *n*. This tire is fastened to the rim by bolts *s*. A British tire is made of pieces of a wooden material *s*. These pieces are fixed into a U-rim *f* by means of three bolts *b*. The surface of the tire is made more elastic by a profile of various designs, Figs. 41 and 42.

Finally may be mentioned a tire where the inner composition material is covered by a ring made of cord wound tightly around the inner tire. The cord may be protected by a running surface of metal.

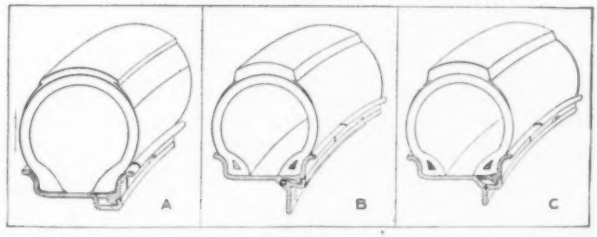
DEMOUNTABLE RIMS OF NEW DESIGN

THREE new types of wheel rims have been developed which are of interest both to users and manufacturers of tires, inasmuch as they are demountable and adaptable to wire and disk wheels.

The base of the wire wheel rim *A*, in the accompanying illustration, is made of hot rolled mill section, low carbon, deep drawing stock, in which there is said to be very little cracking or distortion in cupping or punching. This type of rim lends added strength to the wheel, due to obtaining a greater angle of front and rear spokes; and this also makes it possible to secure wood wheel treads on most cars. The lock ring is of high carbon, hot rolled mill section, heat treated. It is claimed that once this ring is placed on the rim, there is no possibility of throwing it off, also the assembling and removing can be accomplished with ease.

All front and center spokes are laced in the outside channel, thereby permitting the use of shallow cupping and shorter spokes. The outside channel reinforces the entire outside circumferential surface of the wheel. The low channel shoulder is 9/32 of an inch less in diameter than the tire base, allowing the tire to be slipped over it, and doing away with all forcing or jamming. The ring shoulder locks with a fifteen-degree grip of the channel shoulder, making it impossible to unlock the ring when the tire is inflated. The pressure of the air in the tire forces the latter against the lock ring itself with an additional locking strength of seventy pounds to the square inch, and eliminates the danger of the ring being blown or knocked off. A slot ½-inch long is cut into the ring, and when the tire is not inflated the ring is removed by inserting a screw driver into this slot and giving a slight upward pressure.

B is the demountable rim, the steel flange of which covers and supports the outer edge of the felloe, protecting it from impact with the curb, etc. A combination of a T and a Y bar of great strength is formed where the flange joins the rim. The rim is held firmly in place by bolts inserted through six holes equidistant



WIRE WHEEL RIM DEMOUNTABLE RIM DISK WHEEL RIM
THE JOHNSON DEMOUNTABLE RIMS

on the flange. The flange covers the outer circumference of the wheel, hence it is impossible to get the rim on wrong, and when put on, the weight of the tire and the rim causes it to fall into its proper position, the flange fitting tight against the felloe.

C is the disk wheel rim, the steel flange of which begins in a curve and ends in a straight line. The disk can be welded, riveted or bolted to the flange, depending upon the type of the disk. The flange supports and reinforces the disk around its entire circumference. The inverted Y-section of the rim and channel prevent a dishing of the disk or wheel from strains or stresses transmitted from the road.—Johnson Rim & Parts Co., Buffalo, New York.

STRAIGHT-SIDE TIRES ON STRAIGHT-SIDE RIMS

The use of the regular straight-side casing on a clincher rim will quickly result in a ruined tire and a blow-out. Injuries of this kind may be prevented by the use of a bead filler strip in the clinch of the rim. The prevention, however, is almost as bad as the injury, for the resultant effect on the tire is increased side sway, as the support of the tire is concentrated at nearly one point on the base of the rim. The correct procedure is to replace clincher rims with straight-side rims, which will add greatly to the pleasure of motoring at a cost incommensurate with the safety and comfort attained.—Miller News Service.

Repairing Giant Pneumatic Tires

By Roy R. Reid[1]

IN WRITING an article on the repair of pneumatic truck tires it is taken for granted that it is to be of interest to tire repair men experienced at least on passenger tires, and who desire information on a new branch of the repair business about which, up to the present time, very little has been written. Therefore, these paragraphs will deal almost wholly with methods and equipment for repairing truck tires, wherein passenger tire repair methods and equipment will not apply, and details which are common and understood by average repair men will be omitted.

Generally speaking, the repairing of truck tires is a more important operation and requires the exercising of much more care than that of passenger tires because of the originally high cost of the truck casing, and because the failure of the repair will usually result in the loss of the tire. All the common injuries and many of those resulting from improper care and abuse may now be successfully repaired, since equipment has lately been manufactured to handle these tires.

The outfit needed in a repair shop, in addition to the equipment used for passenger tires, would consist of the following molds and equipment:

1—6-inch combination retread and section mold.
1—7 and 8-inch adjustable combination retread and section mold.
1—9 and 10-inch adjustable combination retread and section mold. It depends upon the locality whether or not these molds are necessary.
1—generator of sufficient capacity for above molds; unless there is a sufficient steam capacity in the generator already installed for passenger tire repairing.
1—set combination steam and air bags. Steam hose and connection to supply steam for the above bags.
1—pair giant bead spreaders.
1—flexible shaft buffing outfit.
1—36 by 6 truck tube plate.

The above equipment eliminates the necessity of having 5 molds to take care of the 6, 7, 8, 9 and 10-inch truck tires since

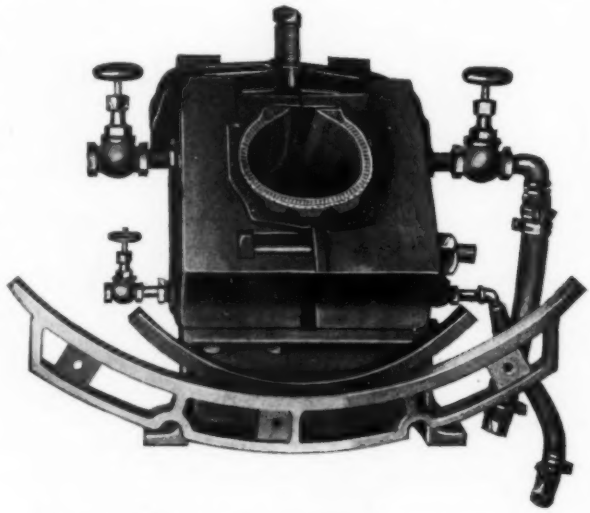
SEVEN TO EIGHT-INCH COMBINATION RETREAD AND SECTION MOLD

the two larger molds in the outfit are adjustable to four sizes of tires, and they are also manufactured as combination retread and section molds, eliminating the necessity of having separate molds for these two different classes of work.

[1] Western Rubber Mold Co., Chicago, Ill.

INSPECTING THE CASING

The first and most important consideration in the successful repair of giant pneumatic tires is the careful examination of the casing and for this purpose the giant bead spreaders should be used so that a clear view of the inside surface may be had. Extra



SEVEN TO EIGHT-INCH ADJUSTABLE COMBINATION MOLD

care should be used in the examination of the exterior for tread and side-wall cuts which if neglected will usually result in a separation. If separation of cords is found to be local only, the repair is justifiable, but if found to be general, a local repair would result only in the failure of the repair. Watch carefully on the inside for wavy appearances at the flexing point of the tire, which indicate underinflation or overloading and cause separations. A large probing awl should be used in making the examinations. The side-wall and beads should also be carefully examined for rim cuts, side-wall cuts and worn out or torn bead covers.

The same care must be taken in preparing the job for rebuilding as that given any pneumatic tire, regarding the cleaning of the surface and buffing the old cords and rubber so that it gets a correct annealment with the new material.

REPAIRING SURFACE CUTS IN TRUCK TIRES

Where no fabric is involved, surface cuts are repaired in the same manner as passenger sizes except that the table of cures, given in this article, should be followed closely.

In tread cuts, where not more than half the plies of cord fabric are involved, it is not necessary to make a lay-back of the tread. Clean and buff and apply stock in and around the injury and repair the same as passenger sizes, but clean out the inside of the tire and reinforce with several plies of cord fabric, or a cord patch of the right proportion, according to the number of plies of cord cut through.

Where an injury involves all the plies of fabric and is less than an inch in length, it is necessary to remove only one group of plies inside the tire, stepping them out diagonally, building them in as removed and then reinforcing on top of this with extra plies as described. Be sure to buff the tire well, inside and out, before applying cement. A flexible shaft buffing outfit is best for this purpose, as it can be carried to the tire and can also be operated inside the casing.

REPAIRING BLOW-OUTS IN TRUCK TIRES

Repairing a blow-out in a truck tire is accomplished in practically the same manner as for small type cords of passenger sizes; that is, cut the plies of cords square across from bead to bead according to location of injury and simply make a lay-back nearly the full length of the mold. Step down the necessary number of plies outside and replace in the same manner, reinforcing the inside with a cord shoe of as many plies as necessary. Repairing each injury must necessarily be a case of judgment on the part of the repair man.

NUMBER OF PLIES OF CORDS IN TRUCK TIRES

6 and 7-inch tires usually have 10 plies of cord fabric
8-inch tires usually have 12 plies of cord fabric
9-inch tires usually have 14 plies of cord fabric
10-inch tires usually have 16 plies of cord fabric

TABLE OF CURES SHOWING LENGTH OF TIME AND AMOUNT OF STEAM PRESSURE WHERE COMBINATION STEAM AND AIR BAG IS USED

TREAD CUTS

	Air Bag Cure	
	Hours	Minutes
Where injury is ⅛-inch deep	1	...
Where injury is ¼-inch deep	1	35
Where injury is ¾-inch deep	2	10

SECTIONS

	Air Bag Cure		Steam Bag Cure	
	Hours	Minutes	Hours	Minutes
On 6-inch tire cure	1	...	1	30
On 7-inch tire cure	1	...	1	40
On 8-inch tire cure	1	...	1	50

SECTIONS WHERE CORD PATCH OR NEW CORD FABRIC IS USED INSIDE THE TIRE

	Air Bag Cure		Steam Bag Cure	
	Hours	Minutes	Hours	Minutes
On 6-inch tire cure	...	50	1	10
On 7-inch tire cure	1	...	1	10
On 8-inch tire cure	1	...	1	10

Note: Cure with air in bag first, then tap bag and turn in steam.

BUILDING UP RETREADS ON GIANT PNEUMATIC TRUCK TIRES

No attempt is made to give a chart of specific widths to cut stock for the building up of treads on the giant pneumatic truck tires for the simple reason that the tires are of so many different percentages of over-size as to make each job a case of judgment, and also for the reason that the operator who is retreading these large tires will have had sufficient experience in the other sizes, so that specific sizes and directions are not necessary.

The most important thing to bear in mind in building the tread on a giant pneumatic tire is that the treads are semi-flat in design,

SIX-INCH COMBINATION NON-SKID RETREAD AND SECTION MOLD

thus making a shoulder on each edge of the tread and, therefore, necessitating the application of more rubber on each side of the tread.

After the tire is cemented, apply cushion gum from 3/32 to ⅛-inch thick in the center and tapering off on the side wall to 1/32-inch. Next, apply a breaker strip of about 5 inches on the 6-inch tire, 5¾ inches on the 7-inch tire and 6½ inches on the 8-inch tire. A wide breaker is necessary to avoid tread separation on the edge of the tread.

In building up the tread itself the best and easiest method of getting the proper contour with sheet stock is to start out with narrow strips on each edge of the breaker, cutting each additional strip somewhat wider than the preceding one until a semi-flat contour is obtained on the tread of the tire. Then by cutting strips which lap from one side of the tire to the other, and each ply a little wider than the preceding one, the proper shape tread will be obtained.

It is a good idea, in learning the amount of stock to apply, to set the tire in the mold after it is cut down, noting carefully the points which need the thickest application of rubber. It is also a good idea to make a template of metal or cardboard the shape

SIX-INCH SECTION MOLD—SEMI-FLAT TYPE

of a cross-section of the mold to place over the tire to determine the shape of the tread to be applied. On the 6-inch tire the shoulder should be approximately 3/16-inch thicker than the center of the tread; on the 7-inch tire, ¼-inch and on the 8-inch tire, 5/16-inch thicker.

A very excellent retread may be produced by having a special stock for building these shoulders on the tire, that is, a cross in compound between cushion gum and tread stock, or cushion gum may be used for this purpose if no other resilient compound can be obtained. This shoulder acts as a "shock absorber" for the hard knocks to which a tire is subjected and eliminates the possibility of the tread separating at the edges on flexing point of the tire. Tire manufacturers are now making camel backs for truck tires, which eliminate a lot of the difficulties of building from sheet stock.

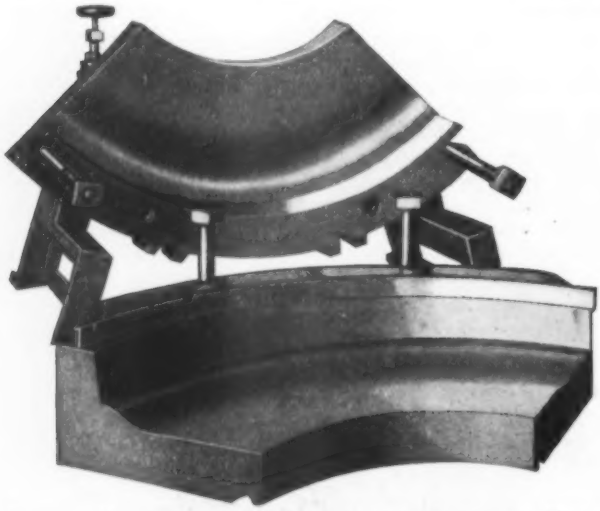
SOME "DO'S" AND "DON'TS" TO OBSERVE

It isn't necessary to put the tire in the sectional mold, provided a shoe is being cured to the inside of the casing and only a small spot on the outside, as this can be very easily done by putting the combination steam and air bag inside the tire, applying the bead molds and cross-wrapping the tire and bead molds with muslin, skipping the place where the raw stock on the exterior must come in contact with the curing surface. The tire may then be placed on the tube plate, so that the plate covers the raw spot, the steam connection made to the steam bag and cured in this manner. The weight of the tire itself will furnish sufficient pressure to cure the tread spot.

Inside sections may be cured in the sectional mold with the steam bag without heat in the mold, provided there is no break or cut to be repaired on the outside of the casing.

An electric light attached to a long cord and covered with a wire guard is a very valuable instrument to use in inspecting the interior of casings, as it will show up every defect of the casing.

In repairing a blow-out it is usually necessary to make a lay-back of the tread and make the step-offs on the outside as far as can be cured in a ¼-circle mold to insure the repair. In curing



SHOWING MECHANICAL CONSTRUCTION OF THE ADJUSTABLE MOLD

a casing in which the non-skid design has not worn to any great extent, fill up these designs with a soapstone mash, place the tire in the mold with steam on, set the bead plates, put a slight pressure on the bag, and after the moisture in the soapstone mash has been allowed to evaporate put the necessary air in the bag to make the cure. This will prevent squeezing the mash out at the ends of the molds and mashing down the design.

Don't forget that it is necessary in curing built-in sections to cure from both sides; that is, use steam in the bag for a part of the cure as specified in the chart. It is impossible to cure a shoe on the inside of a tire with heat from the molds only, and much time is saved by using a combination steam and air bag and curing the shoe at the same time the section is being vulcanized in the mold.

Either use new cord patches, or make them out of successive plies of cords. Take care to see that the reinforcing cords run in the same manner as those which they replace. Different manufacturers build the tires in different ways, some building them in groups; that is, having several plies of cords run in one di-

GIANT BEAD SPREADER

rection and then have the same number running in the other direction, while other manufacturers cross each successive ply. In removing one group only from the outside of a casing, built by the former method, take care to see that the majority of the plies reinforcing the inside run in this same direction.

Do not neglect the small nail holes or tread cuts in a tire which comes in for a repair. "Large blow outs grow from little tread cuts," therefore, look carefully for smaller defects.

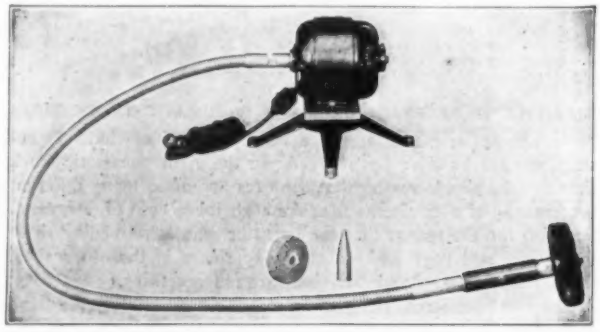
Use a rat-tail rasp in cleaning out the tread cuts or puncture so that the cement will adhere. Use plenty of cushion gum next to the cement. Cushion gum has a great deal to do with holding the repair, and the size of the casing must be taken into consideration and several plies used where only one would be used in a passenger tire.

It is often easier in curing a tread cut or sectional repair, where only a small part of the design must be reproduced, to put in a sufficient amount of rubber and pack the cure with soapstone, afterwards carving out the design with a knife and buffing it rather than making expensive impression pads from rubber and fabric.

Inside fabric breaks may usually be repaired by cord patches if they extend through several plies. However, it is necessary to build an inside section into the tire. Use the awl in finding out the fabric depth before determining what kind of repair to give it.

Place the coated side of the fabric down in rebuilding sections. In rebuilding a section where the cords run in groups, it is well to use a ply of 1/32-inch cushion gum between each group to prevent friction where the cords cross. Use plenty of soapstone before placing the bag inside the tire, to prevent it from sticking to the tire.

Allow the stem opposite to the one which the steam hose is connected to remain slightly open during any cure where steam



FLEXIBLE SHAFT-BUFFING OUTFIT

is used in the bag, closing it tight when air is used. In making a lay-back of a tread, cut across the lowest or thinnest part of the tread design, even if this makes the cut run in an irregular direction, as it will make a neater and more substantial joint.

ITALY'S EXPORTS OF RUBBER, GUTTA PERCHA, AND THEIR MANUFACTURES for the period January-June, 1920, were valued at 89,077,950 lire (provisional returns), as against 21,885,550 lire for the corresponding period in 1919. Normally the lira is worth $0.193; present exchange value is $0.034. Par value is used in these computations. Similar imports into Italy during the January-June period of 1920 were 81,322,960 lire, as against 92,944,700 lire in the corresponding period of the preceding year.

RUBBER SCRAP EXPORTS TO THE UNITED STATES FROM THE BRISTOL, England, consular district in 1919 were valued at $3,464, as against $9,733 in 1918. From the port of Hull, 1,049,007 pounds of crude rubber, valued $342,716, were exported to the United States in 1919, as against 119,594 pounds, valued $49,690, in 1918.

Vulcanized Rubber Energy[1]

By William B. Wiegand[2]

IT IS PROPOSED to discuss very briefly and nonmathematically some of the many interesting energy relationships of vulcanized rubber.

ENERGY STORAGE CAPACITY

In Table 1 is shown what is known as the "proof resilience" of the chief structural materials. This is defined as the number of foot-pounds of energy stored in each pound of the material when it is stretched to its elastic limit. You will observe that tempered spring steel has less than one one-hundredth the resilience of vulcanized rubber, and that even hickory wood, its nearest rival, also shows less than one per cent of the resilience of rubber.

This property of course is directly made use of in airplane shock absorbers, etc., but our present reference to it is made with a view to discussion, first, of the character of this stored energy and its transformation into thermal energy of two kinds; and, second, the modification and in fact remarkable increases in energy storage capacity made possible through the admixture of suitable compounding ingredients.

TABLE I—PROOF RESILIENCE

Material	Ft. Lbs. Per Cu. In.
Gray cast iron	0.373
Extra soft steel	3.07
Rail steel	14.1
Tempered spring steel	95.3
Structural nickel steel	14.7
Rolled aluminium	7.56
Phosphor bronze	4.08
Hickory wood	122.5
Rubber	14,600.00

THERMAL EFFECTS

What happens to the mechanical work done on a rubber sample when it is stretched to any given point? Is it in the form of potential energy of strain, as in the case of a steel spring? No. Has it all been irrecoverably lost in the form of heat, as when a lump of putty is flattened out? No. Or lastly, as when a perfect gas is isothermally compressed, has the work done on the sample been turned into an equivalent amount of heat, convertible back into work during retraction? Here again the answer is, No.

The fact is that rubber has all three properties combined. When you stretch a rubber band, some of the energy is stored as potential energy of strain, exactly as when you stretch a steel spring. Another fraction of the energy input is turned into what may be called reversible heat. You can easily feel this heat on stretching a rubber thread and touching it to your lips. The rest of the energy input or work done on the rubber appears in the form of frictional heat.

RETRACTION

We will suppose that the extension was made rapidly (i. e., adiabatically) and consider what happens on retraction, which we will assume to take place rapidly and immediately. First, the potential energy of strain will nearly all be returned in the form of useful work, exactly as in the case of the steel spring. Second, the reversible heat which on extension acted to increase the temperature of the sample will be reabsorbed, transformed into useful work, and therefore cause no energy loss. Finally, the frictional heat developed during extension will be increased by a further amount on retraction, at the expense of the potential energy of the stretched sample.

Thus, when the rubber has been stretched and allowed to return to substantially its original length, it will differ from its original state only by the total amount of frictional heat developed. By the law of conservation of energy, we can at once say that this frictional heat is exactly represented by the difference between the mechanical energy input and output of our system. This phenomenon is, of course, known as hysteresis, and is exhibited by all structural materials. The fact that in the case of rubber the energy storage capacity is several hundred times greater than in the case, for example, of steel, explains why hysteresis phenomena become relatively of such cardinal importance to rubber technologists.

REVERSIBLE HEAT AND THE JOULE EFFECT

Suppose we extend a rubber sample and allow the reversible heat thus generated to disappear. In other words, we stretch it isothermally. We are then dealing with a system substantially in equilibrium. The two factors governing this equilibrium are, first, the load on the rubber, and, second, the thermal condition. Any change in the equilibrium requires a change in these two factors. Conversely, a change in either of these factors will shift the equilibrium. Now one of the fundamental properties of any equilibrium is that when any factor is changed the equilibrium will be shifted in such a way as to offset the change in the factor. Thus, if the load is increased, the sample will stretch and become stiffer so as to resist the increased load. Similarly, if the temperature of the sample is increased, the rubber will contract, since in so doing heat is used up and in this way the disturbance minimized.

This contraction on heating was predicted by Lord Kelvin, after Joule had discovered, or rather rediscovered, the development of heat during extension. Metals and most other rigid bodies behave, of course, in a totally different fashion. Instead of generating heat on extension they consume heat and become cooler, with the result that the application of heat to a stretched metal wire causes it to expand instead of contract, as in the case of rubber.

The Joule effect has been subjected to many misinterpretations, such, for example, as attributing it to a huge negative temperature coefficient of expansion, which is incorrect, since rubber has in fact a large positive coefficient. Others have attempted to explain the phenomenon by assuming an increase in Young's modulus. Bouasse, the French investigator, who has done such masterly work on the elastic properties of rubber, disproved this hypothesis, however, and showed in fact that Young's modulus decreased with increased temperature.

The writer has not done any experimental work on the reversible heat which governs the Joule effect, but there can be no doubt as to its technical importance. Thus, for example, the internal state of a solid tire tread as well as breaker conditions in large pneumatics is clearly bound up with the reversible thermal effect as well as with the frictional thermal effect. Every time the tire tread impacts upon the road surface each part of the rubber stock traverses a stress-strain cycle. Even if we admit that the reversible heat generated during extension is reabsorbed during contraction, we have to consider the gradual building up of internal temperatures due to accumulation of frictional heat. This increase in temperature, acting through the Joule effect, will lessen the extensibility of the heated rubber as compared with adjacent regions at lower temperatures, thus setting up strains which doubtless play a role in breaker separation, the bane of large-size pneumatics. It is therefore highly desirable to work out rubber compounds which will develop not only minimum frictional heat, but also minimum reversible heat. Quantitative measurements of the Joule effect with different compounds and different cures would serve as an index to this quantity.

[1]Presented before the Rubber Division at the meeting of the American Chemical Society, Chicago, Illinois, September 6-10, 1920.

[2]Ames Holden McCready, Limited, Montreal, Canada.

MECHANICAL PICTURE OF RUBBER

The diagram in Fig. 1, which was first suggested by a former colleague, Doctor F. M. G. Johnson, of McGill University, helps clarify one's mental picture of the thermodynamical phenomena associated with rubber strains. Rubber may be viewed as a combination of a cylinder of gas, a steel spring, and a friction member. Following this picture, extension of the rubber is accompanied in the first instance by compression of the gas, thus generating the reversible heat, Q_R. In the second place, the steel spring is compressed, thus generating the increase in potential energy of strain, E. Lastly, the friction element operates through the extension, generating nonreversible heat, Q_F. When the rubber retracts, the gas expands, the spring retracts, and the friction element contributes another increment to the nonreversible heat.

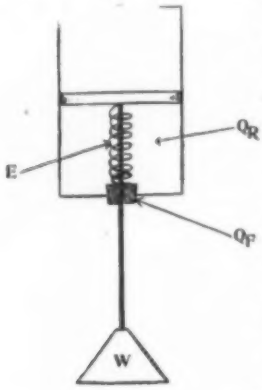


FIG. 1. MECHANICAL PICTURE OF RUBBER

Suppose the sample is extended and we apply heat to the system. The gas in the chamber will expand so as to use up heat, raising the weight W, thus shortening the rubber and so constituting the Joule effect.

FRICTIONAL HEAT OR HYSTERESIS

Although the reversible heat has doubtless a decided technical significance, by far the most important energy transformation is that of useful work into heat through hysteresis, and a short account will here be given of some experiments carried out under the author's direction by H. F. Schippel.

Briefly, the method consisted in generating hysteresis loops by graphically recording stress-strain curves of extension and retraction up to varying elongations. By means of the planimeter the area of the hysteresis loop was determined and the readings calculated to foot-pounds of energy referred to one cubic inch of rubber. In order to obviate the inertia of dead weight tensile machines, and for other reasons of convenience, a special machine was devised, the principal features of which were the alinement of a helical steel spring with the sample and the use of extremely light and nicely fitting parts. The rubber sample was merely a standard test piece about 0.1-inch in thickness, 0.25-inch wide, and 2 inches between shoulders. The ends of the test piece were secured in special light weight clamps designed practically entirely to obviate creeping. The spring extension measured the stress, and the separation of the clamps, the strains.

Through the use of this special machine it was possible to generate stress-strain cycles under both rapid, or adiabatic, and slow, or isothermal, conditions.

ISOTHERMAL CYCLES ADOPTED. It is of course obvious that the size and character of the hysteresis cycles will depend on whether they are generated adiabatically or isothermally. Under the former conditions, the reversible and frictional heat developed on extension are only slightly dissipated, and so act to increase the stiffness of the sample and alter the trend of the curves. Owing to the difficulties of inertia, it was not found possible to generate adiabatic loops at speeds sufficient to allow of concordant results. The method finally adopted was to generate the cycles at low speeds, for example, 20 inches per minute, or under practically isothermal conditions.

PRELIMINARY EXTENSIONS. It is well known that the area of the first hysteresis loop is greater than that of the second, and so on. In most cases, however, the third loop differs only very slightly from the succeeding loops, and so in our work when it was the intention to generate the hysteresis loop up to an elongation of 300 per cent, the test piece which had not been otherwise handled after cutting from the molded slab was put through two preliminary cycles up to 300 per cent, and then clamped into the machine, and its hysteresis loop graphically recorded. In taking a succession of loops at increasing elongations the same test piece was used and two preliminary loops made at each elongation. The initial length upon which the cycles were based was the length measured after the two preliminary extensions had been made.

RANGE OF COMPOUNDS USED. The experimental results included tests on a standard series of factory compounds used in tire construction. They thus included practically pure gum friction compounds, lightly loaded breaker compounds, and more heavily loaded tread stock. These various stocks were mixed in the factory under standard conditions, and given laboratory cures ranging from 50 per cent of the optimum cure in each case up to cures 275 per cent over the optimum in some cases.

Hysteresis loops were generated at elongations ranging from 100 to 500 per cent. There is considerable difference in opinion as to whether in measuring hysteresis one should work to a fixed percentage of the breaking load, irrespective of the elongation, or work to a definite elongation, irrespective of the load required. The latter method seems to the writer the only correct one from the technical standpoint, in view of the fact that the strains incurred, for example, by the skim coat, breaker, and tread of a pneumatic tire are arbitrarily fixed by the inflation pressure and the load.

RELATION BETWEEN HYSTERESIS LOSS AND CYCLIC ELONGATION. Fig. 2 illustrates the results obtained with a typical pure gum, high-grade tire friction with a breaking elongation of upwards of 900 per cent. This particular compound contained 5 pounds of sulphur to 100 pounds of rubber, of which 60 were first latex rubber and the other 40 a soft-cured wild rubber. The only other ingredients were a small percentage of thiocarbanilide and 5 pounds of zinc as activator. The energy units are expressed as one-hundredths of a foot-pound calculated to a cubic inch of rubber. The relationship is of the character of a rectangular hyperbola, and the hysteresis increases very sharply for elongations exceeding 300 per cent. Viewing hysteresis as frictional loss, it is natural to expect sharply increased friction to accompany the rapidly increasing lateral compressions in the test piece. Following our mechanical picture, it is analogous to contraction of the friction element upon the moving arm.

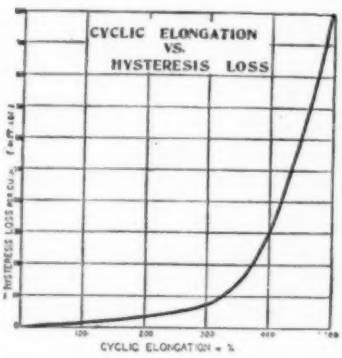


FIG. 2

ADOPTION OF STANDARD LOOP. For comparison of different compounds and for different cures it was decided to adopt a standard cyclic elongation, and in order to reduce experimental error it was of course desirable to select an elongation lower than 300 per cent, or lying on the flat portion of the curve. For higher elongations the energy loss changes so rapidly with slight changes in the elongation as to make concordant results difficult. Moreover, a brief calculation of the strains set up, for example in the skim coat of a pneumatic casing run under service conditions shows that under conditions of standard factory practice the rubber is strained to an elongation of not much more than 200 per cent each time the tire flattens against the road. For comparative purposes we therefore adopted a standard cycle of 200 per cent elongation.

RELATION BETWEEN STATE OF CURE AND HYSTERESIS LOSS

It is commonly held by tire technologists that the state of cure of the friction and skim coat of the carcass has a lot to do with the early or late occurrence of ply separation.

Fig. 3 does in fact show that the state of cure has an influence on hysteresis. What is shown as the normal cure on this chart is the optimum cure as determined by the tensile product. An under-cure of 50 per cent, for example, means that if the optimum curing time is 90 minutes at 40 pounds of steam pressure, the sample was cured for 45 minutes. Similarly with over-cures. Curves *A* and *B* are typical skim coat compounds. Curve *C* is a breaker compound. It will be observed that minimum hysteresis occurs in the over-cured region. It must, of course, be kept in mind that these data apply only to cycles of 200 per cent elongation, whereas the rubber stock in question has an ultimate elongation of over 900 per cent. Attention must also be called to the danger of assuming that a slight over-cure is therefore desirable. Aging conditions must be taken into consideration, and the writer is of the personal opinion that the optimum cure or, in many cases, an even shorter cure is the correct condition. It is also noteworthy that the actual magnitude of the hysteresis values characteristic of high-grade, pure gum frictions is very low, and that we must look elsewhere for the true cause of ply separation.

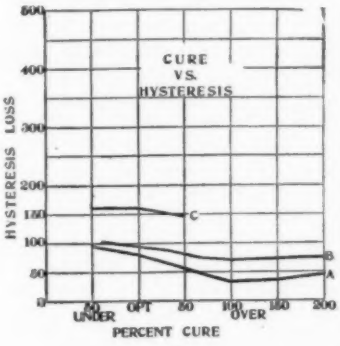


FIG. 3

(To be Continued)

AMERICAN RAILWAY ASSOCIATION, MECHANICAL DIVISION, MASTER CAR BUILDERS' AND MASTER MECHANICS' SPECIFICATIONS

STANDARD AIR-BRAKE AND TRAIN AIR-SIGNAL HOSE

Adopted, 1903; Revised, 1916

I. MANUFACTURE

1. SCOPE. These specifications supersede all previous specifications for air-brake and signal hose, including that for "woven and combination woven and wrapped air-brake hose." Air-brake hose of the woven and combination woven and wrapped type shall meet all tests of these specifications except that of friction, section 4, on those constructions where friction cannot be made.

2. PHYSICAL PROPERTIES. All hose shall be soft and pliable and not less than four-ply. They shall be made of rubber and cotton fabric, each the best of its kind for the purpose.

II. TESTS

3. TESTS. Hose shall be subjected to the following tests, which shall be made with the temperature of the air not lower than 65 or higher than 90 degrees F., and the samples shall be kept at a temperature within these limits for at least one-half hour previous to the time of test.

4. FRICTION TEST. The quality of friction shall be determined by suspending a 20-pound weight from the separated end of the duck of one of the 1-inch test specimens described in Section 9, the force being applied radially. The separation shall be uniform and regular, and the average speed shall not exceed 8 inches in 10 minutes, the distance being measured while the weight is still in place.

5. STRETCHING TEST. Test specimens from tube and cover will be quickly stretched until the 2-inch marks are 10 inches apart and immediately released. They will then be remarked as at first within 10 seconds after starting to release and again stretched to 10 inches between the new marks, remaining so stretched for 10 minutes. The specimens shall then be completely released, and within 30 seconds after starting to release the distance between the marks last applied will be measured, and the initial set must not be more than ¼-inch. At the end of 10 minutes the distance between the marks will again be measured, and the final set must not be more than ⅛-inch. These test specimens may be cut from the tube and cover of the friction-test specimen, but shall not be used for tensile test.

6. TENSILE STRENGTH. Test specimens from tube and cover shall be pulled in a tensile machine with a test speed of 20 inches per minute. The inner tube must have a tensile strength of not less than 800 pounds or more than 1,200 pounds per square inch and the cover not less than 700 pounds or more than 1,100 pounds per square inch. The elongation shall be such that the marks, originally 2 inches apart, stretch to at least 10 inches before specimen breaks. If the tensile strength in pounds per square inch is greater than that required, the sample may be accepted, providing the per cent increase in elongation is equal to or greater than the per cent increase in tensile strength in pounds per square inch above the maximum figure.

7. POROSITY TEST. The remaining 17 inches shall be mounted and placed in a test rack, the circumference will be measured and the hose filled with air at 140 pounds pressure per square inch, the rubber cover shall be cut from clamp to clamp (taking care not to injure the duck) and this pressure maintained for 5 minutes. At the end of this time the hose will be submerged in water to determine whether the inner tube is porous. The escape of air through the tube shall be distinct enough so that the porosity will not be confused with the escape of air which is confined in the structure of the hose. In the event the hose fails on bursting test at the point at which cut was made for porosity test and a satisfactory hydraulic test is not obtained, the porosity and hydraulic test will be repeated on another piece of hose.

8. BURSTING TESTS. The section of hose which was used for porosity test shall then be subjected to a hydraulic pressure of 200 pounds per square inch, under which pressure it shall not expand in circumference more than ¾-inch for air-brake hose and 11/16-inch for air-signal hose, nor develop any small leaks or defects. After the above test this section shall then stand a hydraulic pressure of 500 pounds per square inch for 10 minutes, without bursting or developing any small leaks or defects, after which the hydraulic pressure shall be increased to a minimum of 700 pounds per square inch without bursting, at the rate of not less than 100 or more than 200 pounds per five seconds.

9. TEST SPECIMEN. (a) A hose shall be selected at random and a 5-inch section cut from one end. Two sections, each 1 inch long, shall be cut from the 5-inch section for making friction, stretching and tensile tests, the remaining 3-inch section shall be used for making additional tests, which may be desired on the tube and cover. Stretching and tensile test specimens shall be cut from the tube and cover with a die having the dimensions shown in Fig. 1.

(b) In measuring the thickness of the test specimen shown in Fig. 1 to determine the strength per square inch, a micrometer graduated to 0.001-inch having a shoe 0.24 to 0.26-inch in diameter, exerting a pressure of from 8 to 10 ounces on the test specimen, shall be used.

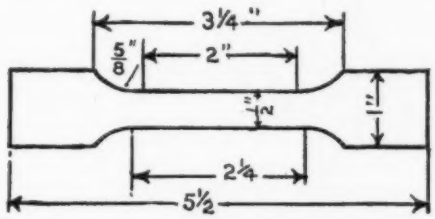


FIG. 1

10. NUMBER OF TESTS. For each lot of 200 pieces of hose one extra hose shall be furnished free of cost for test purposes.

III. PERMISSIBLE VARIATIONS

	Length, Inches	Outside Diameter, Inches	Inside Diameter, Inches	Thickness of Cap Vulcanized on, Inches
AIR-BRAKE HOSE:				
Maximum	22½	2⅜	1⅞	⅜
Minimum	22	2⅛	1⅜	⅜
AIR-SIGNAL HOSE:				
Maximum	22½	1⅞	1⅜	⅜
Minimum	22	1⅛	1⅛	⅜

IV. WORKMANSHIP AND FINISH

11. WORKMANSHIP. (a) Tube. The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it will meet the friction tests prescribed in Section 3. The tube shall be of such a composition and so cured as to successfully

meet the requirements of tests given in Sections 4 and 5, the tubes to be not less than 3/32-inch thick.

(b) Cover. The cover shall be of the same quality of rubber as the tube and shall be not less than 1/16-inch thick, and shall meet the requirements of tests given in Sections 4 and 5.

12. DUCK. Construction. The canvas or duck used as a wrapping for the hose shall be made from long-fiber cotton, and shall weigh not less than 22 ounces per lineal yard, 40 inches wide. It shall have five threads per strand and not less than 16 nor more than 22 strands per inch of width, for both warp and filler. The duck shall be cut and applied on a bias of from 42 to 46 degrees, with edges lapped at least 0.5-inch and both sides well frictioned.

13. FINISH. The hose shall be smooth and regular in size throughout its entire length.

V. MARKING

14. SERIAL NUMBER. Each lot of 200 or less shall bear the manufacturer's serial number, commencing at 1 on the first of the year and continuing consecutively until the end of the year.

15. LABEL. Each length of hose shall have vulcanized on it a label of red rubber, as shown in Fig. 2. This label shall be applied

FIG. 2

on the hose at a point 6 inches from the end (a variation of ½-inch either way will be permitted) and with the top of the lettering toward the center of the hose.

VI. INSPECTION AND REJECTION

16. INSPECTION. (a) The manufacturer shall afford the inspector, free of charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

17. REJECTION. Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, or prior to being placed in service, develops weak spots or imperfections, or fails to pass any one of the tests herein required, within 60 days from date of shipment, will be rejected and shall be replaced by the manufacturer at his own expense.

18. REHEARING. Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report to the manufacturer.

INTERESTING LETTERS FROM OUR READERS

ILL-ADVISED LECISLATION

TO THE EDITOR:

DEAR SIR: I have your courteous favor, suggesting that I comment on the article on page 337 of your February issue with regard to the carbon black industry in Louisiana.

The danger to the existence of the carbon black industry from ill-advised legislation, based on an imperfect and incomplete knowledge of the facts, has called into being the National Gas Products Association, which comprises the makers of about 95 per cent of all the carbon black that is made. The situation has been carefully considered in the meetings of this association, and we are very glad to avail ourselves of this opportunity to state briefly the general situation as we see it.

Carbon black is the base of the black printing inks of this country and to a considerable extent of those of Europe and Asia. Its chief use, however, is for admixture with rubber, to which it imparts much greater tensile strength than any other material yet used for this purpose. It also possesses the great advantage of never wearing glossy, and is therefore not likely to slip, and gives good tractile effect on a smooth pavement and greatly diminishes the danger of skidding in tires.

Assuming the correctness of the article referred to, one of the largest wells would have enough gas to supply all of the carbon black factories in Louisiana, and it would be very regrettable to deprive the world of carbon black when the gas in excess of that required for its manufacture was one hundred-fold the present use for the same, and when the gas wasted in this state has exceeded and probably is exceeding the amount consumed. By "waste," I mean the escape of gas unburnt into the open air from oil wells and from gas wells that are not wholly under control.

I particularly call attention to the fact that not only the makers of automobile tires, but, also, of soles and heels for shoes, ferrules for crutches, chairs and tables; makers of rubber boots, hose and other mechanical rubber goods, can greatly increase the durability of their goods, if they will use from 10 to 25 per cent of carbon black in their mix, according as they want a very flexible rubber or a very hard rubber. I have, for years, worn black rubber heels on my shoes, and find that they will wear more than twice as long as leather heels and give a better grip on the ground beside.

I recently wrote to Mr. Polk, who is one of the leaders in the movement to transport and distribute this gas, that so far from being a hindrance in this laudable purpose, he would find the carbon black makers the greatest possible help, first, by giving such guaranties of an adequate supply of gas as could not be otherwise obtained in that field, and second, by assisting directly and indirectly in raising the needful capital.

I received a very courteous and cordial reply, and I believe that the situation is now better understood in Louisiana and that no effort will be made to interfere with existing factories.

We shall try to secure our members the permits needful to erect machinery already contracted for, and when this is done we think there will be a sufficient output to take care of the probable increase in demand for some years to come, and the question of wholly new enterprises being permitted to start is less urgent at the present time. GODFREY L. CABOT.

Boston, Massachusetts, February 7, 1921.

GOODYEAR'S RUBBER CANNON BALLS

TO THE EDITOR:

DEAR SIR: Here is a bit of rubber history. In 1855 Mannsell B. Field was the commissioner from the State of New York to the Paris Exposition. He wrote as follows:

"Perhaps the most creditable exhibition of all was that of Goodyear's articles of vulcanized india rubber. These were comparative novelties then and were manufactured by Mr. Goodyear in France under his patents there. After he had gone to a good deal of expense in fitting up the compartment which was assigned to him, the French exhibition authorities insisted that he should exhibit with them. This he was unwilling to do. They were all inflexible, saying, 'Does the exhibitor present himself as manufacturer or as inventor?'"

The writer does not state how the matter was settled. Then he continues: "The day before the Exposition opened the French Emperor and Queen were wandering from room to room and, coming to the writer, the Emperor said, 'Good evening,' and after a few commonplaces he said that in walking through our department of the exposition he had seen many things that interested him, but that nothing had so much pleased him as Mr. Goodyear's vulcanized india rubber; that among Mr. Goodyear's articles, however, he had noticed something which had interested him then and continued to interest him ever since.

"Continuing, he said: 'In one corner I saw stacked as one sees them in an artillery yard, a pile of vulcanized india rubber cannon balls.'

"I went directly to Mr. Goodyear's compartment, and asked the person in charge what in the world he expected to do with india rubber cannon balls. 'They are not cannon balls,' he answered, 'they are footballs.'"

It seems the Emperor wondered how any preparation of india rubber could be used for projectiles. Of course, this was before automobile tires were thought of.

Vineland, New Jersey. R. E. HOTCHKISS.

What the Rubber Chemists Are Doing

Caoutchouc Considered as a Colloid[1]

By D. F. Twiss

WHEN Graham established the difference between crystalloids and colloids he realized that they are separated by no real boundary, but joined by certain connecting links. Caoutchouc is a typical colloid, although its colloidal nature is not easily explained, as our knowledge of the colloids is still principally based upon materials that have been produced by artificial means.

Colloidal materials generally are divided into suspensoids and emulsoids. The suspensoid contains suspended in the body of the material particles which can be made visible only by aid of the microscope. Emulsoids contain particles only in fluid form, which are mostly dissolved in the body of the material. Natural caoutchouc may be designated as a double colloid. The latex forms a milky fluid which contains particles of colloidal character. Hinrichsen and Kindscher identify these particles as caoutchouc suspended in a watery fluid, the serum of the latex. The activity of these caoutchouc particles varies greatly according to the origin of the latex.

CAOUTCHOUC LATEX

If latex is exposed to electrical influence the caoutchouc particles move to the anode, leaving the fluid clear in the neighborhood of the cathode, proving that these particles are negative and that the latex is a negative suspensoid. The separation of the caoutchouc from the latex is very similar to that of clay in aqueous colloidal suspension. The separation of suspensoids of this sort is considerably facilitated by the assistance of acids, hence, latex is coagulated usually by addition of small amounts of acetic acid. Alkalies, on the other hand, strengthen negative suspensoids. The action of acids and alkalies establishes the conclusion that the presence of ketones regulates the speed of the separation of caoutchouc from latex.

By dialysis soluble salts may be extracted from the latex of the *Hevea*. Latex so treated cannot be coagulated by monovalent metallic salt solutions. Alkaline salts coagulate latex if the concentration is not above normal, while heavy metallic salts effect coagulation at a concentration of one-twentieth normal. In the case of caoutchouc latex containing mineral salts, concentration may be reduced proportionally.

According to the strength of the coagulating medium, raw caoutchouc separates as a spongy mass or a firm elastic body. The first form of separation may be regarded as the uncompleted form of the second. The quality of the caoutchouc depends largely on the form of coagulation. Selection of the coagulating medium and the system of coagulation is a matter of practical importance and has led to the attempt to introduce recognized standard methods in plantation practice.

It is possible to increase the stability of a suspensoid by the presence of a second colloid or emulsoid. This characteristic is made use of in the manufacture of photographic plates. Latex contains, besides water, the caoutchouc proteins, the presence of which strengthens the suspensoid and acts as a protector. Dilution reduces this action, which is why the addition of water to the latex aids the formation of the "cream" or spontaneous separation of caoutchouc particles. Addition of an agent neutralizing the effect of the protein also increases the separation of the suspensoid. The protective agent is not always an albuminoid. The latex of *Funtumia elastica* contains a peptonoid which exerts a similar effect. The neutralizer in this instance is formaldehyde, which in the case of *Hevea* adds to the stability of the latex.

If fresh latex has been sterilized by subjecting it to heat it becomes immune against the action of acids, and the addition of a small quantity of fresh latex becomes necessary to reestablish the property of coagulation. This occurrence has been attributed by Eaton to the presence of microbes, but the existence of microbic action is held to be not absolutely necessary to produce this effect, since the presence of enzymes appears to be a sufficient explanation.

RAW CAOUTCHOUC

When raw caoutchouc is subjected to a solvent the latter slowly enters it, causing it to expand greatly and forming, with the assistance of shaking, a viscous colloid solution. Carbon bisulphide, chloroform and benzene yield comparatively clear solutions of caoutchouc, while naphtha, gasoline or ordinary ether produce milky solutions. The difference in the appearance of the solution is due not only to variations in index of refraction of the solvent and suspended particles, but is caused also by the presence of materials of varying solubility. Caoutchouc which dissolves practically entirely in the first named of these solvents dissolves only partially in the others. The undissolved portion is held colloidally suspended. Even in apparently clear colloidal solutions, as of gelatine or agar-agar, one may discover submicroscopic particles by means of the ultra-microscope. Turbid caoutchouc solutions compared to clear ones must be regarded as colloidal solutions of a lower order. Solutions of technical caoutchouc mixtures, which contain sulphur and other filling materials, are inferior as regards the size of the particles in suspension.

CAOUTCHOUC AND EMULSOID

While latex may be classified as a simple suspensoid, caoutchouc is an emulsoid. The viscosity of emulsoids is greater than that of suspensoids. Such colloids as gelatin probably retain their colloid character permanently. They consist of a colloid substance finely dispersed in a colloid medium, which causes it to be spongy or cellular and unchanged by ordinary means. Raw caoutchouc, however, is a substance in which the caoutchouc hydrocarbon is very finely distributed in a medium formed probably by the protein of the latex. Since deproteinated caoutchouc retains its typical character, it is practically certain that its colloid nature is caused by two forms of caoutchouc substance of different molecular weight and molecular condition. The influence of heat, light, or acids brings about remarkable changes in the viscosity of caoutchouc solutions caused probably by changes in either colloidal or molecular conditions or by both combined. The lessened viscosity of gutta percha and balata solutions and the ease with which they separate from solution permits the conclusion that the hydrocarbon of gutta percha and balata is less complex in nature than that of caoutchouc.

ABSORBENT EFFECT OF CAOUTCHOUC

A characteristic of all emulsoids is the possibility of condensing upon their surface materials of a different kind, as shown in the case of coloring material. This explains why during coagulation of latex part of the coagulation material is retained which can be removed only with difficulty. Coagulation materials, therefore, should consist only of volatile substances and the quantity that is added should be small. If coagulated caoutchouc is allowed to stand several days the protein undergoes partial decomposition with formation of basic substances and acid amines which cannot be removed completely from the caoutchouc by washing and drying. Their presence exerts a marked catalytic influence upon vulcanization. The difference in quality between wild and plantation caoutchouc without doubt is caused by the varying quantities of catalysers which the two varieties contain.

[1] Le Caoutchouc et la Gutta-Percha, March 15, 1920, pages 10240-43.

The study of the colloid character of caoutchouc has led Hoehn and Ostwald to doubt the chemical nature of vulcanization. Removal of the uncombined sulphur in vulcanized rubber by prolonged acetone extraction shows that some of the sulphur has been absorbed and not simply dissolved by the caoutchouc.

Certainly absorption plays a considerable part during the changes of the vulcanization. It is still accepted as true that the sulphur is chemically united to the vulcanized material. The absorption of sulphur does not cease when the first chemical action has been completed. All of the caoutchouc in the vulcanized material loses its original character and cannot be regarded merely as a mixture of vulcanized and unvulcanized caoutchouc. It is conceivable that the part of the caoutchouc solution which has combined with the sulphur has been absorbed irreversibly by another caoutchouc part which would bring about a change in the colloidal condition and possibly also a change in the polymerization. Vulcanized caoutchouc can still be regarded as an emulsoid in a form more permanent and stabilized than raw caoutchouc. Vulcanized caoutchouc does not retain the adhesive character of raw caoutchouc, which by milling on rollers will form plastic sheets, increasing in softness and plasticity by further mechanical treatment. This treatment changes the structure of the emulsoid. Regeneration of old rubber consists in restoring vulcanized caoutchouc to a condition such that its characteristic colloids will be modified and assume the viscous condition of raw caoutchouc.

CAOUTCHOUC DIALYSIS AND COMPOSITION

A caoutchouc membrane can be used for the purpose of making dialyses of raw caoutchouc solutions. If a membrane is made from a slightly vulcanized caoutchouc disk and on one side of it is placed a sulphur-caoutchouc solution, and the pure solvent on the other, the sulphur will pass through the membrane. By renewing the solvent all sulphur can be extracted from the caoutchouc solution. The old vulcanization method of Hancock is based on the diffusion of sulphur in caoutchouc.

Notwithstanding general scientific advancement, specific knowledge of colloids is still very limited and the nature of caoutchouc and other natural colloids is still not completely solved. The colloid characteristic of coautchouc is a considerable obstacle in the production of synthetic caoutchouc. The present system of coagulation followed upon the plantations facilitates the enzymic actions. During vulcanization no special transformation can be traced; the only sign of the formation of a new product is given by the chemical combination of the caoutchouc with sulphur according to the formula $C_{10}H_{16}S_2$.

Graphical representation of the caoutchouc molecule, vulcanized or unvulcanized, is possible by a cyclic formula. The sulphur certainly is bound to the caoutchouc, at least in part. Vulcanization is a weak exothermic action. The exothermal heat of the vulcanized caoutchouc is somewhat less than that of all its components. It is generally admitted that the speed of diffusion of a gas through caoutchouc depends upon the solubility of the gas in caoutchouc and the specific speed of the gas has little influence upon the result. Caoutchouc cannot be regenerated after vulcanization by mere dialysis. The combined sulphur does not dialyze, neither can a solution of the vulcanized material be effected without the employment of very energetic means, which entirely changes the nature of the caoutchouc.

THE INTERPRETATION OF RUBBER ANALYSES[1]

In the analysis of vulcanized rubber the principal tests applied at present are: acetone extract, chloroform extract, alcoholic potash extract, ash, total sulphur, free sulphur, mineral and organic fillers, and special tests for the detection and determination of such substances as paraffine, oils, glue, etc.

[1] "The Interpretation of Rubber Analyses," by John B. Tuttle. The Chemical Bulletin, Volume VII, No. 12, December, 1920, page 323.

ACETONE EXTRACT

The acetone extract may contain resinous matter from the crude rubber, free sulphur, oils and waxes. The rubber resins average between two and four per cent in high-grade rubber, and the presence of more than these amounts suggests the use of low-grade or reclaimed rubber.

CHLOROFORM EXTRACT

The chloroform extraction is made for the purpose of detecting bituminous substances such as the so-called mineral rubbers. It is only qualitative, for a large part of these substances are soluble in acetone, and cannot be isolated. The brownish solution in chloroform is not to be mistaken, and even as little as one per cent is readily detected.

ALCOHOLIC POTASH EXTRACT

Alcoholic potash (or soda) dissolves the so-called oil substitutes. There is always a small amount of extract from the rubber, but it should never exceed one per cent of the amount of rubber present. More than this amount is a pretty fair indication of the use of oil substitutes.

FATTY OILS

Fatty oils, such as palm oil and cottonseed oil, were probably added for their softening effect, but mineral oils usually denote the presence of reclaimed rubber. Paraffine wax is desirable in insulated wire in order to close up the minute pores in the rubber. It is easily isolated and determined with great accuracy, while from the qualitative point of view its presence is easily discernible by the white flakes which separate, on cooling, from the acetone solution.

SULPHUR

Sulphur is not only added as such for the purpose of effecting vulcanization, but is contained in reclaimed rubber, oil substitutes, accelerators and fillers, and the total sulphur determination gives only the sum of the sulphur content of these various substances.

In special cases, such as high-grade insulated wire, and wherever the sulphur might have a deleterious effect on materials with which it may come in contact, the free sulphur should be kept as low as is consistent with safe manufacturing practice, but beyond this, it is in itself harmless. However, it has been observed that low-grade crude rubbers and reclaimed rubber require a larger excess of sulphur for vulcanization than do the best grades of either wild or plantation rubber, and a high free sulphur content suggests the use of these cheaper grades.

ASH

The ash is the mineral residue left on ignition. It should be remembered that some fillers change composition on heating, others react during vulcanization to form new compounds, while some fillers are more or less volatile. Hence the value of this determination is problematical and depends largely on the material being tested.

RUBBER

Probably the most important determination is one which is seldom made, and that is the percentage of rubber present. The usual practice is to calculate this quantity by difference after determining all other constituents. A vast amount of work has been done to develop methods for the direct determination of rubber, but only a few of these have any merit whatever, and these are usually time-consuming, require special equipment or have some other drawback which prevents their widespread adoption. The percentage of rubber is important because experience has shown that in order to obtain reasonable service a certain minimum amount of rubber is necessary. Rubber being normally one of the more expensive components of rubber articles, it is only natural that manufacturers should seek to use no more than that actually needed.

CONCLUSION

The interpretation of the chemical analyses of rubber articles should be approached with a consideration of the methods used in making the analyses, the probable error of these methods, the

purpose for which the article is to be used, and the effect of the various constituents on the service. If the purpose of the analysis is to determine whether or not material complies with specifications, then the latter should include the methods by which the material is to be analyzed, and if it does not, the methods should be known to anyone who attempts to decide whether or not the terms of specifications have been met. In other words, the results of analyses of rubber compounds are inseparable from the methods by which they were obtained.

DIRECT DETERMINATION OF RUBBER BY NITROSITE METHOD

A discussion on the direct determination of india rubber by the nitrosite method, by John B. Tuttle and Louis Yurow, has been published as No. 145 of the Technologic Papers of the U. S. Bureau of Standards.

The method, which was reviewed in THE INDIA RUBBER WORLD, October 1, 1917, page 17, is adapted to the analysis of vulcanized compounds containing reclaimed rubber, lampblack, bituminous substances and oil substitutes. It does not attempt to discriminate between new and reclaimed rubber and the authors state that so far as they know there is no quantitative method today which will determine the percentage of either kind in a mixture of the two. Their method gives merely the total of the two kinds, and the average quality must be determined by means of the usual mechanical tests of tensile strength, elongation, permanent set, etc.

CHEMICAL PATENTS

THE UNITED STATES

PROCESS OF VULCANIZATION OF RUBBER IN WHICH AN ADDITION OF dichloranilin is made to the substance to be vulcanized prior to the vulcanization step.—Carl R. De Long, Washington, D. C., and Warren Neal Watson, Auburn, Maine. United States patent No. 1,364,732.

THE DOMINION OF CANADA

VULCANIZING RUBBER. A PROCESS OF VULCANIZING ARTICLES consisting in maintaining a chamber filled with steam at substantially atmospheric pressure and substantially excluding air from the articles contained in the chamber, and superheating the steam to effect vulcanization.—The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of Willis A. Gibbons, Pelham Manor, New York, U. S. A. Canadian patent No. 207,221.

VULCANIZED CAOUTCHOUC, PROCESS AND PRODUCT IN WHICH caoutchouc, zinc oxide, a vulcanizing agent and an aryl substituted thiourea accelerator having an alkyl group in ortho position, are mixed and subsequently vulcanized.—The Goodyear Tire & Rubber Co., assignee of Winfield Scott, both of Akron, Ohio, U. S. A. Canadian patent No. 207,718.

PROCESS OF PRODUCING VULCANIZED CAOUTCHOUC WHICH COMprises incorporating into rubber the products resulting from the decomposition of a proteid by means of an aqueous solution of an alkaline carbonate.—The Goodyear Tire & Rubber Co., assignee of Clayton W. Bedford, both of Akron, Ohio, U. S. A. Canadian patent No. 207,719.

METHOD OF VULCANIZING CAOUTCHOUC CONSISTING IN REACTING upon paranitroso-dimethyl-aniline in solution in an inactive neutral solvent with hydrogen sulphide, incorporating a small percentage of the resultant base into a caoutchouc mixture and heating with a vulcanizing agent.—The Goodyear Tire & Rubber Co., assignee of Clayton W. Bedford and Robert L. Sibley, coinventors, all of Akron, Ohio, U. S. A. Canadian patent No. 207,982.

MANUFACTURE OF THIOCARBANILIDES AND VULCANIZATION OF caoutchouc. The method of producing a substituted thiourea which consists in carrying out the reaction between aniline and carbon bisulphide in the presence of paranitroso-dimethyl-aniline. In the art of vulcanizing caoutchouc the incorporating the above resultant mixture of substituted thiourea into the caoutchouc mix and heating the same with a vulcanizing agent to effect vulcanization.—The Goodyear Tire & Rubber Co., assignee of Clayton W. Bedford and Robert Sibley, coinventors, all of Akron, Ohio, U. S. A. Canadian patent No. 207,983.

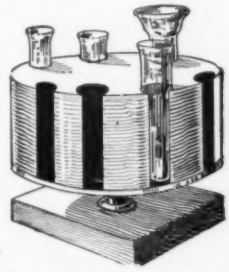
COMPOUNDING RUBBER PRODUCTS CONSISTING IN FIRST FORMING an emulsion of water, a gel-forming proteid, oil and gas-black, incorporating the same into the rubber and evaporating out the moisture from the mixed product previous to vulcanization.—The Goodyear Tire & Rubber Co., assignee of Robert C. Hartong, both of Akron, Ohio, U. S. A. Canadian patent No. 207,984.

LABORATORY APPARATUS

TEST-TUBE HOLDER

SOME reformed chemist with an inventive turn has found that his poker chip holder lends itself for easy conversion into a test-tube rack for the laboratory.

An old discarded poker chip holder can be utilized to good advantage, as shown in the illustration, for holding extra test-tubes. For further convenience, a round board may be fitted to the bottom and, with spindle attached, be arranged to revolve upon a base. Such a holder will take care of several test-tubes of varying diameters and prove a convenient laboratory utility.—*Popular Science Monthly*, New York.



HANDY TEST-TUBE RACK

FOUR-HEAT ELECTRIC DISK STOVE

The illustration shows a very convenient electric disk stove newly placed on the market. It is adapted for laboratory use as well as for culinary purposes. It may be regulated for four different degrees of heating by placing the regulating plug in different positions. The stove contains two heating coils which are connected to the three terminals. The top is made of aluminum and the stove sets upon a metal deck provided with fiber rests for protecting the table.—The Waage Electric Co., Inc., 12 South Jefferson street, Chicago, Illinois.

ELECTRIC LABORATORY STOVE

LABORATORY ENAMEL

An enamel for use on the walls and furniture of laboratories should be white, adhere perfectly and be washable with either hot or cold water. Such an enamel is to be had and the makers claim, in addition to the above qualities, that it is proof against the action of sulphuretted hydrogen, acid and alkali fumes and chemicals.—Toch Brothers, 320 Fifth avenue, New York.

BARIUM SULPHATE IN SOUTH AFRICA

Samples of barium sulphate produced by a firm near Johannesburg, South Africa, have been transmitted by the American consul in that district to the Bureau of Foreign and Domestic Commerce, Washington, D. C. The firm states that it has a fair deposit of this material and is prepared to deliver it in reasonable quantities f. o. b. steamer at Cape Town. The sample can be inspected by referring to file No. 20,945, and the name of the firm desiring to market the material will be sent by the Bureau or its district and cooperative offices by referring to file No. B E—6011.

New Machines and Appliances

BICYCLE TIRE TRIMMING MACHINES

ORIGINALLY when bicycle tires were first manufactured, they were made in two-piece molds and only two lines of overflow had to be removed. Today, practically ninety-five per cent of the tires contain fancy non-skid treads and to perfectly produce these non-skid designs, three-piece molds are used. Consequently, three lines of overflow must be removed and the combined length of the three circular overflow lines on each tire equals nearly 21 feet. To do this by hand is a slow and expensive proposition, and the automatic trimming machines shown in the illustrations are claimed to be rapidly replacing the hand method.

Referring to Fig. 1, the machine is removing the overflow from the tread of a bicycle tire which rests on a grooved roller in front of the cutters. The shaft supporting this roller is driven from the counter-shaft which is fastened to the base of machine, and as the tire travels with the grooved roller the overflow is removed. It is held in a vertical position by two idle rollers, the grooves of which are made large enough to

FIG. 1. TRIMMING BICYCLE TIRE—TREAD OVERFLOW

accommodate all sizes of tires. They are held in position by steel rods fastened to the mounting board and can be adjusted to tires of different diameters.

Fig. 2 is a side view of a horizontal machine, showing the overflow being removed from the inside of the tire which is supported by idle rollers on each side and in the rear. The shaft and grooved roller in front of the cutters are held in place by an extension arm bearing. The extension arm is connected to a steel support which is securely fastened to the mounting board by a rod running through its hub. The rod is threaded on one end and enters the knob on the left side of the support. By turning the knob, the extension arm and the tire is moved into or away from the cutters as desired, either trimming the tire very closely or allowing a small margin of rib. From the extension arm, a projection extends downward with a rod attached to the end. The rod hooks into a disk which is fastened to the mounting board. A lever extends from the side of the disk and by moving this lever the extension arm and the tire are raised or lowered as desired. A spring is attached on the shaft between the bearings of the extension arm and this presses the tire against the cutters and acts as a cushion, allowing the tire to give and take as it revolves.

Each machine is complete with a motor and necessary cord with connecting plug for attaching to the lighting system. The tire starts revolving as soon as it is placed in position on the

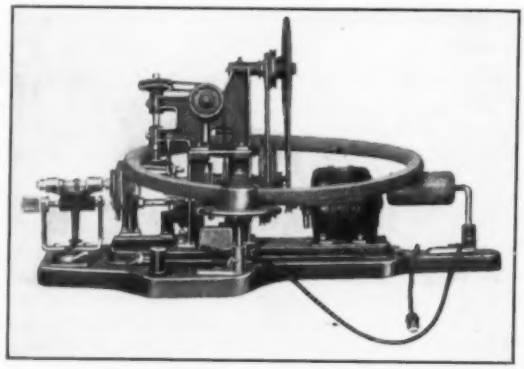
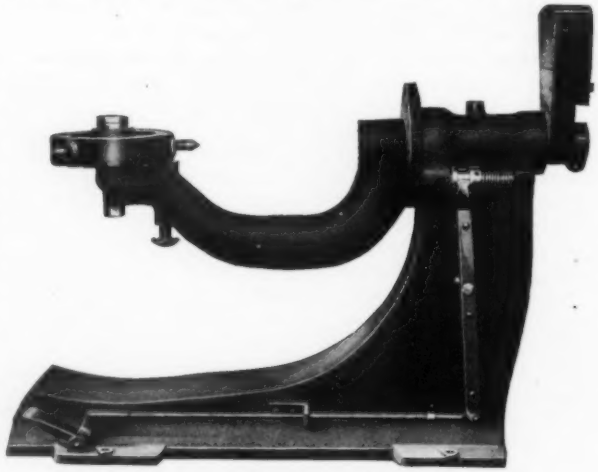


FIG. 2. TRIMMING BICYCLE TIRE—INSIDE OVERFLOW

machine and it can be stopped or taken away at any time while the machine is running. The average production of a skilled operator is 20 to 25 tires an hour. Under the same conditions the machine is claimed to trim 100 tires per hour.—T. W. Morris, 3304 Warren avenue, Chicago, Illinois.

GIANT TRUCK-TIRE BUILDING STAND

Every rubber tire manufacturer will be interested in this new model tire-building stand which has been particularly designed for use in the construction of heavy pneumatic truck tires. It is strongly built of cast iron, and provided with bolt holes for attaching to the floor. It is fitted throughout with Timken roller bearings. The core upon which the tire is built is placed in the rotatable chuck attached to the arm, and as the tire is built up, layer upon layer, the operator can easily turn the core around, as the result of perfectly balanced bearings. The arm support can be moved in any direction which will enable the



REYNOLDS TIRE-BUILDING STAND

operator to perform the work better and quicker. A foot lever on the right-hand side of the stand is connected with two powerful springs which are part of the operating mechanism.

The floor space required is five feet and six inches by two feet four inches and the weight is 1,250 pounds unpacked.—The Reynolds Machine Co., Massillon, Ohio.

METAL STEAM OR AIR BAG

The short service duration of the ordinary rubber and fabric air bag, used for inflating and curing cord tires, is the source of great expense in the production of such tires. Frequently such air bags are serviceable only for six or eight cures, which necessitates practically continuous replacements. In the expansible metal steam or air bag shown in the illustration the inventor has provided a very durable and efficient substitute in either the sectional or endless type.

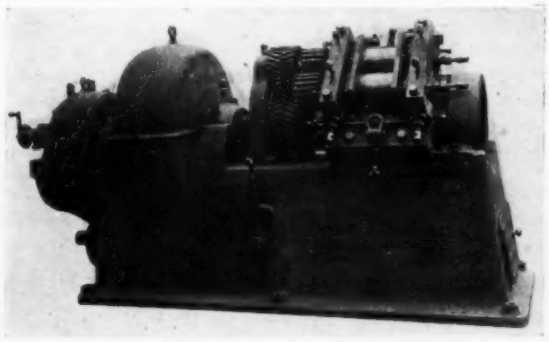
EXPANSIBLE METALLIC AIR BAG

These bags are made of sheet metal and are operated by steam, or steam and air combined, raising the working pressure up to 150 pounds per square inch. The sectional type is designed for repair work while the endless type is collapsible and is intended for the elimination of the usual cast-iron building cores. Tires may be built directly on the steam bag, which is removable sectionally from the tire after the cure—The Allsteel Ridewell Tire & Rubber Co., Dayton, Ohio.

ENGLISH TUBING MACHINE FOR SOLID TIRES

Forming solid truck tire stock, especially in the larger sizes, requires very strongly and heavily built forcing machines. In American rubber manufacturing practice such machines are fed by hand. In English practice it is customary to employ some form of machine feeding device.

A 14-inch motor-driven tubing machine for running the largest sections of truck tires is shown in the illustration. It was specially designed to meet the English and Continental demand for



SOLID TIRE TUBER

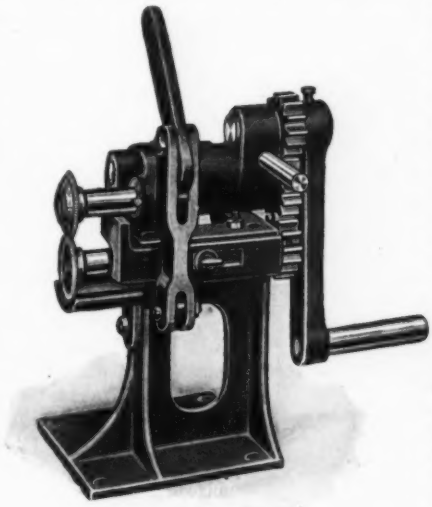
a machine capable of running continuously. The screw of the machine is hollow and fitted with a water-cooling device.

The stock is fed into the machine by a pair of rollers geared to the spindle and made adjustable so that the feed can be regulated to suit the size of the tire desired. It has a two-speed gear, low for the smaller sections and high for the larger ones. The gearing throughout is machine-cut and a large ball-thrust washer of special design is provided to take the full thrust of the screw when in operation.

The illustration shows the machine with a pair of feed rolls. To insure a more even feed and elimination of all back pressure the machine has recently been provided with an improved single roller feed in which the roller is placed in direct contact with the screw. This was illustrated and described in THE INDIA RUBBER WORLD, December 1, 1920, page 179.—Francis Shaw & Co., Limited, Manchester, England.

MACHINE FOR REMOVING BEADS

In resoling tires, and also when reclaiming tire carcasses, it is necessary to remove the bead, which operation involves considerable time and labor when done by hand. The machine shown in the accompanying illustration offers the repairman a more practical way to do this class of work. The machine itself is of cast iron with steel knives which rotate by turning the hand-crank, each knife turning forward and each entering the fabric at the same time. The head of the machine is hinged so that the tire can be inserted between the two circular knives without first cutting the bead by hand. The knives can be adjusted farther apart for extra heavy tires by means of a lever. Furthermore, the knives are so constructed as to feed the tire along when cutting. The operator needs only to guide the tire and the machine does the rest of the work. As an aid to guiding the tires, two rollers are frequently placed under the casing. The bead cutter is made to become a staple piece of equipment and has bolt holes for bolting to the bench.—Progressive Shoe Machinery Co., Minneapolis, Minnesota.



THE PROGRESSIVE BEAD CUTTER

TIRE CORE CONVEYING SYSTEM

A very convenient overhead system for handling tire cores is shown in the illustration. The track is suspended from the ceiling and is provided with a series of switches which permit the transference of the tire and core to any desired point.

OVERHEAD TIRE CONVEYOR

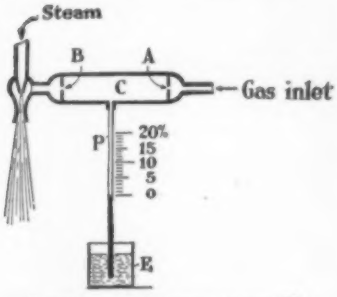
The track extends the full length of the building, from the calender to the curing room, and is used for handling both fabric

and rubber, particularly frictioned fabric from calender to bias cutter. At this point in the system the fabric is weighed as it passes over a certain section of track which is connected to a scale in the floor.

The stock of tire cores is never allowed to rest on the floor, but hangs on individual hooks. The tires are transferred in the building process over the tracks which extend through the entire building department into the curing room alongside the alleys where the cores are transferred from the hooks into the molds for curing. The saving in labor is particularly great when operating the core equipment to capacity.—Lampson Company, Des Moines, Iowa.

NEW CO_2 RECORDING INSTRUMENT

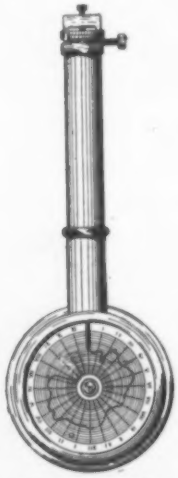
Rubber manufacturers who are striving to overcome fuel and heat wastage in the boiler room will be interested in this new model CO_2 recording equipment, for which are claimed simplicity, quicker action and greater accessibility of parts. The economy and compactness of combining in one machine means for determining CO_2 simultaneously from any number of boilers up to a total of six, are easily recognized.



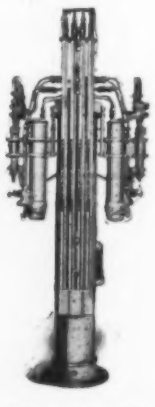
PRINCIPLE OF OPERATION OF THE CO_2 METER

A single unit equipment for one boiler consists of three principal parts, the CO_2 meter proper, recorder, and auxiliary boiler front indicator. The meter is placed wherever more convenient. Its function is to determine the CO_2 and then actuate the boiler front indicator and recorder in the engineer's office accordingly. An aspirator draws the gas continuously through first aperture *A* and then *B*. Absorption of the CO_2 content between the two apertures causes a change of pressure or tension in chamber *C* which is transmitted to the recorder and indicator.

INDICATOR FOR BOILER FRONT



RECORDER FOR ENGINEER'S OFFICE



METER FOR FOUR BOILERS

The CO_2 meter consists of this analyzing mechanism and a regulator. The regulator keeps the suction created by the aspirator constant, thereby eliminating changes in tension between apertures *A* and *B*, except those caused by absorption within chamber *C*. It is the latter changes in tension which the indicator and recorder register instantaneously. The gas travel is hastened by utilizing the main aspirator's exhaust in an auxiliary aspirator for drawing the gas from the boiler up to the absorption chamber, while the main aspirator draws the gas sample through this. Suitable filters remove soot and dirt from the sample.

The record is not intermittent but furnishes an autographic history of the operation of each boiler for every second of the day. The indicator guides the fireman in supplying just the right amount of air to burn the fuel with least loss of heat up the chimney. This recording equipment is designed primarily for rough and ready boiler plant service.—Uehling Instrument Co., 71 Broadway, New York.

MACHINERY PATENTS

MACHINE FOR REFINING RUBBER

AN ATTEMPTED improvement upon the ordinary chilled two-roll refining mill is shown in Fig. 1. The essential parts of this machine are a vertical hollow, water-cooled spindle *A* provided with a stock feed-screw *B* and an enlarged conical portion *C* which is a central obstruction filling in greater or lesser degree the circular water-cooled die *D*. The adjustment of the opening for passage of the stock is effected by vertical movement of section *E* by the motion of screws *F* and *G* actuated by hand-wheel and worm-gearing *H* and *I*. Below the die *D* a circular table *J* is attached to the spindle *A*. The latter is driven by gear and worm *K* and *L*.

In operation the stock, fed into hopper *M*, is forced by screw *B* downward through the adjustable circular space between the die and spindle and emerges onto the table *J* refined from mechanical impurities. The advantages claimed for this machine are a larger working surface in proportion to its size than with rolls and that it obviates the difficulty of producing the necessary pressure that rolls require.—William A. Gordon, assignor to Birmingham Iron Foundry, both of Derby, Connecticut. United States patent No. 1,364,549.

MODIFIED FRICTION CALENDER

Fig. 2 illustrates a vertical side elevation of a three-roll friction calender modified by the addition of attachments so that two rolls of fabric *A* and *B* may be friction-coated with rubber composition at the same time. The bank of stock is applied at points *C* and *D* and the coated fabrics received on the rewinding rollers *E* and *F*. The latter are operated by sprocket chains *G* and *H* acting through sprocket wheels *I* and *J*.—Edward H. Scribner and Harry A. Bell of Revere, assignors to Revere Rubber Co., Chelsea, both in Massachusetts. United States patent No. 1,364,211.

TREAD MAKING MACHINE

This machine, illustrated in Fig. 3, in longitudinal vertical section, is for building and curing tire tread bands. It comprises the foundation plate *A*, frames *B*, and a number of radiating arms *C* connected by circular braces *D*, the lower arms being secured to the base plate. The standards and arms are duplicated on each side of the machine.

The outer ends of the arms *C* form a guideway in which is mounted a guide *E*. On the lower end of each guide is a shoe *F*, its inner surface forming the arc of a circle. Six of these shoes when in their innermost positions, form a complete circle of the size required for the outer circumference of the tread band. Keyed to shaft *G* are two large hand-wheels *H*, *H*, for operating each side of the machine.

Just inside the frames, pinions *I* mesh with two sets of fan-shaped gear sections *J*. The gear sections in each set of six are placed in staggered relation and engage with pinion *I*, the rotation of which rocks the segments and moves the slides *E* radially

through the eccentrics *K* formed on the outer end of the short shaft *L*. On the outer ends of the center shafts *G* slidable drums *M* are mounted, upon which tire tread bands may be built. A screw mechanism operated by a hand-wheel *N* serves to slide the building drum under the contracting shoe-like section *F* for curing the band.

In operation, a tire tread band is built on the drum *M* at one

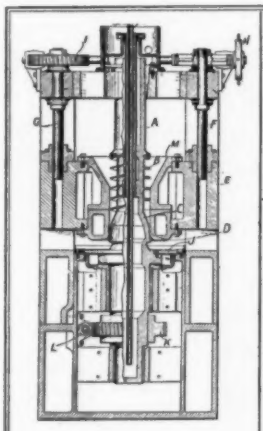


FIGURE 1
Rubber Refiner

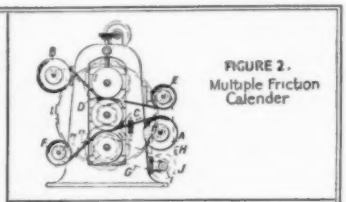


FIGURE 2.
Multiple Friction Calender

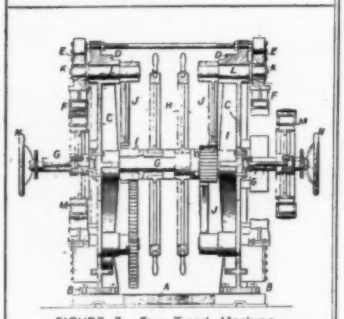


FIGURE 3. Tire Tread Machine

side of the machine and moved into curing position. By turning the capstan wheel *H*, sections *F* are closed upon the band.

Sections and drums are chambered for steam circulation to provide the heat for curing. One workman operates each side of the machine alternately.—Harvey F. Maranville, assignor to the Firestone Tire & Rubber Co., both of Akron, Ohio. United States patent No. 1,365,115.

OTHER MACHINERY PATENTS

THE UNITED STATES

NO. 1,364,132 Toothed roller for treating raw rubber and rubber substitutes. C. E. Miller, Anderson, Ind.
1,364,133 Tube-splice vulcanizer. C. E. Miller, Anderson, Ind.
1,364,183 Take-off mechanism for rubber mixing mills. S. Dietrich, Cudahy, Wis.
1,364,241 Mold for tire treads. G. W. Brownell, Leominster, Mass.
1,364,362 Pneumatic-pad tube-splicing apparatus. E. Fetter, assignor by mesne assignments to The Pneumatic Tube Steam Splicer Co.—both of Baltimore, Md.
1,364,386 Tire-making machine. C. Kuentzel, assignor to The Akron Rubber Mold & Machine Co.—both of Akron, O.
1,364,845 Machine for shaping the lip of an inscle. H. A. Sadler, Swampscott, assignor to Plymouth Rubber Co., Canton—both in Mass.
1,364,985 Inner tube connector and vulcanizer. W. C. Ehrenfeld, Flemington, N. J.
1,365,066 Machine for wrapping and unwrapping tires. E. E. Shoopman, Cairo, Neb.
1,365,104 Expansible core for curing tires. A Huetter, Dayton, assignor to the Firestone Tire & Rubber Co., Akron—both in Ohio.
1,365,294 Tire mold. G. E. Tiller, Sioux City, Ia.
1,365,365 Tube repair vulcanizer. J. W. Arthur, assignor to The Williams Foundry & Machine Co.—both of Akron, O.
1,365,463 Apparatus and method for manufacture of inflated rubber articles. N. D. Crawford, Milford, Conn., assignor to The Mechanical Rubber Co., a New Jersey corporation.
1,365,528 Dipping and drying apparatus for rubber articles. H. A. Mitzel, Providence, Rhode Island, assignor to Revere Rubber Co., a Rhode Island corporation.
1,365,560 Apparatus and method for making rubberized cords. W. J. Steinle, Elmhurst Heights, N. Y., assignor to The Hartford Rubber Works Co., a Connecticut corporation.
1,365,581 Apparatus for cleaning inside of tire casings. H. G. Ballou, Los Angeles, Calif.
1,365,709 Collapsible core for tires. E. M. McCurry and G. R. Bilger, assignors to The Banner Machine Co.—all of Columbiana, O.
1,365,764 Apparatus for removing flexible rubber articles from forms or cores. J. W. Brundage, assignor to The Miller Rubber Co.—all of Akron, O.
1,366,290 Tire mold core. F. Smith and T. H. Brittain—both of Akron, O.
1,366,342 Hose-coating apparatus. L. Atwood, Boston, Mass.
1,366,547 Apparatus for wrapping tires with paper. W. M. Wheildon, Ashland, and Edward H. Angier, Framingham, both in Mass.; said Wheildon assignor to said Angier.
1,366,750 Tire mold core. F. Smith and T. H. Brittain—both of Akron, O.

THE DOMINION OF CANADA

207,070 Tire expander of soft rubber, etc. O. A. Peterson and O. M. Brancel, coinventors—both of Minneapolis, Minn., U. S. A.
207,135 Mold for retreading tires. A. B. Legnard. Waukegan, Ill., U. S. A.
207,295 Tire-building core and chuck. P. and B. De Mattia, coinventors, both of Clifton, New Jersey, U. S. A.
207,296 Tire-building core. P. and B. De Mattia, coinventors, both of Clifton, New Jersey, U. S. A.
207,299 Tire-peeling machine. E. P. Hafner and J. T. Roberts, coinventors, both of St. Louis, Mo., U. S. A.
207,516 Steam connection for hollow tire core. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Hampden—both in Mass., U. S. A.
207,517 Collapsible tire core. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Hampden—both in Mass., U. S. A.
207,518 Collapsible tire core. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Hampden—both in Mass., U. S. A.
207,519 Collapsible tire core. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Hampden—both in Mass., U. S. A.
207,520 Apparatus for building up cord blankets for pneumatic tires. The Goodyear Tire & Rubber Co., assignee of E. A. Nall, executrix of the estate of E. Nall, deceased—both of Akron, Ohio, U. S. A.
207,560 Collapsible tire core. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Sr., Hampden, both in Mass., and T. Midgley, Jr., Dayton, Ohio—all in U. S. A.
207,591 Tire repair vulcanizer. G. B. Cooper, Joplin, Mo., U. S. A.
207,717 Automatic valve controller for hydraulic press. The Goodyear Tire & Rubber Co., assignee of W. E. Shively and E. B. Kilborn, coinventors—all of Akron, Ohio, U. S. A.
207,741 Tire repair vulcanizer. The Western Vulcanizer Manufacturing Co., assignee of H. K. Wheelock—both of Chicago, Ill., U. S. A.
207,776 Mold for pneumatic tire covers. W. N. Rees, Sydney, and F. Jolly, Randwick, both in New South Wales, coinventors.
207,806 Apparatus for vulcanizing rubber. W. B. Burke, Cleveland, Ohio, U. S. A.
207,976 Overflow cavity for tire molds. The Fisk Rubber Co., Chicopee Falls, assignee of T. Midgley, Hampden, both in Mass., U. S. A.
207,985 Vulcanizing press for cord tires. The Goodyear Tire & Rubber Co., assignee of E. G. Templeton, both of Akron, Ohio, U. S. A.

THE UNITED KINGDOM

151,867 Rubber-heel mold. A. Mond, 19 Southampton Buildings, Chancery Lane, London. (The Miller Rubber Co., Akron, Ohio, U. S. A.)
152,305 Tire-repair vulcanizer. F. Sinzig, 33 Aarbergergasse, and H. Wenger, 39 Neuengasse, both in Berne, Switzerland. (Not yet accepted.)
152,520 Apparatus for coating cloth, etc., with plastic substances. C. A. Harnden, Newton House, Newton, Hyde, Cheshire.
152,744 Apparatus for molding flushing-tank-valve balls. F. T. Roberts, 1105 Lakeview Road, and R. H. Rosenfeld, 1895 East 71st street—both in Cleveland, Ohio, U. S. A.
152,804 Device for opening tire molds. Dunlop Rubber Co. and C. Macbeth, 1 Albany street, Regent's Park, London.

PROCESS PATENTS

THE UNITED STATES

1,365,061 Manufacture of unwoven rubberized cord fabric and product. R. B. Respess, New York City. (See THE INDIA RUBBER WORLD, June 1, 1919, page 482.)
1,365,327 Curing rubber hose by pressure and heat. E. G. Kimmich, assignor to The Goodyear Tire & Rubber Co.—both of Akron, Ohio, U. S. A.
1,366,220 Manufacture of cord tires. J. A. Swinehart, Akron, O.

THE DOMINION OF CANADA

207,527 Building up cord tires. The Goodyear Tire & Rubber Co., assignee of E. A. Nall, executrix of estate of E. Nall, deceased—both of Akron, Ohio, U. S. A.
207,904 Manufacturing pneumatic tires from fabric treated with neutral amorphous non-colloidal sulphur compound, etc. W. B. Pratt, Wellesley, Mass., U. S. A.
207,981 Improved method of splicing inner tubes. The Goodyear Tire & Rubber Co., assignee of C. B. Orr—both of Akron, Ohio, U. S. A.
207,995 Manufacturing battery-jars of uncured rubber. The Joseph Stokes Rubber Co., assignee of H. L. Boyer—both of Trenton, New Jersey, U. S. A.
207,996 Forming hard rubber storage-battery jars. The Joseph Stokes Rubber Co., Trenton, New Jersey, assignee of T. A. Willard, Cleveland Heights, Ohio—both in U. S. A.

THE UNITED KINGDOM

150,143 Treating crude rubber with live steam, to produce uniform degree of softness. Dunlop Rubber Co., J. V. Worthington and A. W. T. Hide, 14 Regent street, Westminster.
152,275 Combining sheet rubber or leather with vulcanizing solution of rubber and sulphur as adhesive. J. Brown, 10 Market Square, Auckland, N. Z.

GERMANY

PATENTS ISSUED, WITH DATES OF ISSUE

331,018 Improving soles and heels of rubber shoes. Heinrich Karl Major and Marie Alexandrine Major, née Odou, Helmstrasse 10, Berlin, Schöneberg.

New Goods and Specialties

A CHANTICLEER FROM FRANCE

MANY IMPPORTED TOYS are now making their appearance in the shops, bearing mute witness to the efforts of the erstwhile warring countries to "come back" in even the simplest ways. Bits of different kinds of material are combined cleverly to produce a toy that is grotesque or humorous, but always unique.

INFLATABLE WHISTLING COCK

The toy shown in the accompanying picture is a real French cock, made of good-quality natural cream-colored rubber of the kind used for balloons. The legs are wood, to which shaped pieces of heavy cardboard are tacked for feet. The legs themselves are securely cemented to the rubber. The bill, which is a whistle, and the mouthpiece at the tail, are both of wood, likewise cemented in place. The eyes are painted on the rubber, to produce a raised effect. The wings are carefully colored in red, yellow and green, beneath the stamped design, and the crest and tail are simulated by real colored feathers cemented in position.

When the toy is inflated it will stand alone, and the whistling bill produces a shrill note. This gradually weakens as the air escapes and the cock falls over and "goes West."

This toy is protected by the French registered trademark "DD."

THE "GINGERBREAD" DOLL IN RUBBER

Reminding one at once of the old-fashioned gingerbread doll, comes a line of toys made of sponge rubber, cut to shape and

SOME MEMBERS OF THE BOBS FAMILY

sewed where necessary to produce a finished doll. One of these, Betty Bobs, greeted the readers of THE INDIA RUBBER WORLD September 1, 1920, where a more detailed description was given. We are now glad to present her with her brothers and sisters. The "Bobs Family" includes Betty, Bobby and Billy Bobs and the Bobs Twins.—Rees Davis Toy Co., 180 North Dearborn street, Chicago, Illinois.

THROAT MICROPHONE TRANSMITTER DEFIES AIR-BORNE SOUNDS

The telephone with the throat microphone transmitter is a direct outcome of a war need, as it was invented especially for use in airplanes where the noise of the engine rendered it impossible for pilot and passenger to communicate by any known telephone. This type of microphone is insensitive to air-borne sounds but when placed against the side of the throat while a person is talking, transmits speech clearly, unaffected by external noises.

The telephone instrument equipped with the throat microphone transmitter is similar to the ordinary English hand combination telephone, except that it is held to the ear while the microphone transmitter rests lightly against the side of the throat. The instrument has all metal parts nickel-plated and is fitted with an ebonite handle, which not only adds to the appearance but also provides insulation. For long conversations, such as central work, the transmitter is mounted in a cloth necklet to be used in conjunction with a head-gear receiver.

The illustrations show both a wall and table central battery telephone with throat microphone transmitters, and the manner

ENGLISH TELEPHONES EQUIPPED WITH THROAT MICROPHONE

in which the device is held. Other types have also been developed, including magneto and battery call telephones for both wall and table, interphones with automatic cut-in and cut-out device, etc.

The throat microphone transmitter is invaluable in noisy places, and in addition to its acoustic superiority over the ordinary telephone mouthpiece, it possesses great advantages from a hygienic point of view.—The Sterling Telephone & Electric Co., Limited, 210-212 Tottenham Court Road, London, W. 1, England.

TIME-SAVING ELASTIC SHOELACE

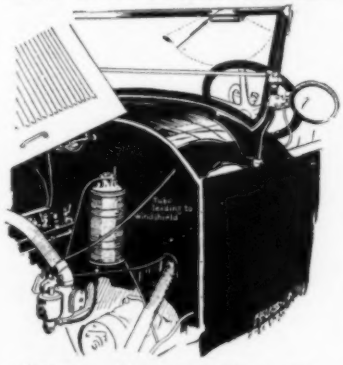
An elastic shoelace that requires no lacing, tying or fastening of any kind after the first insertion, and no change in the construction of the shoe, is a recently patented invention. Its use permits the shoe to be pulled on and off without unlacing. The elastic shoelace consists of a length of narrow elastic tape, with an extra amount of stretch, having ordinary metal shoelace tips on the ends, put on for convenience in the first lacing and then cut off. The ends of the lace are then kept from pulling out by attaching soft metal clips, which are provided with each pair of shoelaces. A particular method of inserting the lace must be followed, and is in fact part of the patent, as this allows the elastic to stretch sufficiently to permit inserting the foot easily. The lace is claimed to last the life of the shoe. It can be applied to all styles of shoes, including oxfords or low shoes, as well as

METHOD OF LACING

ladies' high top boots.—United States patent No. 1,358,753, Benjamin F. Killam and Samuel Schlesinger, Jr., Denver, Colorado.

AUTOMATIC WINDSHIELD CLEANER

A new form of the familiar rubber windshield cleaner is that known as the Folberth Automatic. It consists of a compact mechanism with a light metal sweep bearing a rubber cleaning edge which bears against the outer side of the windshield. The apparatus is mounted on top of the shield and is operated automatically by the suction of the engine. A convenient finger control is turned to start the cleaner sweeping back and forth, preventing rain, sleet or snow from settling and obscuring the driver's vision, leaving both his hands free when most needed for safe guidance of the car.—The Folberth Auto Specialty Co., 7914-7922 Lake avenue, Cleveland, Ohio.



FOLBERTH AUTOMATIC WINDSHIELD CLEANER

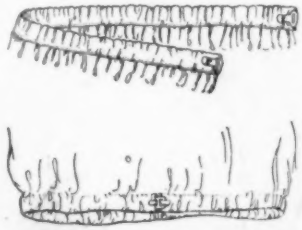
HEAVY INNER TUBE FITTED WITH "TIROMETER"

The exact air pressure in a tire casing is shown at all times by the "Tirometer," a combination air valve and air pressure gage, which was described in THE INDIA RUBBER WORLD, April 1, 1920. This accessory is now to be had only as fitted to "Tirometer" heavy touring tubes, which are pure gum, full laminated tubes made with a special preservative that is said to assure endurance and resistance against heat. A transparent, practically unbreakable dust cap protects the "Tirometer," without interfering with the instant reading of the air-pressure gage. "Tirometer" heavy touring tubes are made in red and gray, in sizes from 28 by 3 inches to 40 by 8 inches.—Currie Brothers Co., Inc., Atlanta, Georgia.

"TIROMETER" HEAVY TOURING TUBE

THE "HOLDZIT" CLASP MAKES ELASTIC LAST

Manufacturers as well as wearers of women's garments will welcome the advantages of the "Holdzit" elastic belt fastener, which is attachable to any garment without sewing. On account of the perishable nature of rubber when subjected to the process of laundering, women everywhere will be glad to get the "Holdzit" elastic which can be easily and quickly inserted, and as easily removed for the purpose of washing a garment, besides permitting the garment to be spread out flat for ironing, even in an ironing machine.



"HOLDZIT" FASTENER FOR ELASTIC BANDS

The patented "Holdzit" clasp acts as a hook at one end and an eye at the other, while either end can be used as a bodkin for threading the belt into the tube in the garment. A portion of the clasp is bent into a flat hook which lies close against the material and prevents the elastic from slipping back into the tube when unfastened, yet is easily detached when removing the elastic. The "Holdzit" fastener comes in black and white non-corrosive metal attached to any quality of elastic in black or white, in any length desired, in widths of ¼, ⅜, ½, and ⅞-inch. It commends itself for use with blouses, petticoats, bloomers and pajamas, also in the finer qualities of silk elastic for camisoles, brassieres, and undervests.—Holdzit Fastener Corporation, 18 Broadway, New York City.

TO AID THE WOULD-BE SWIMMER

The latest device to assist the amateur swimmer or the one just trying to learn is called the "Rubba-Float." It consists of a rectangular inflatable cushion or bag, provided with an inflating valve at one corner and tapes firmly cemented to two corners of the bag by triangular-shaped pieces of fabric, for tying the float in position back of the wearer's waist, as illustrated.

THE "RUBBA-FLOAT"

The "Rubba-Float" is inflated in the same way as a toy balloon and by pressing between the thumb and forefinger the rubber tube at the end of the valve, the air within will not escape while a fresh breath is being taken. The device will fit better if not filled too full with air. When sufficiently inflated, the valve is closed by inserting a screw and tightening it as much as possible. The air will then remain within indefinitely, no subsequent inflation being required.

The "Rubba-Float" is absolutely waterproof and will, it is claimed, sustain either child or adult in the water.—United States patent No. 1,364,275. I. B. Kleinert Rubber Co., 719-727 Broadway, New York City.

A CORD TIRE FROM PENNSYLVANIA

"Quaker" cord tires, though new to the trade, have been undergoing severe service tests for the past three years and have exceeded all expectations of their makers and users. They are extra-size and their construction is said to make them remarkably easy-riding. The typical "Quaker T. T. T." raised black tread has been found to be as nearly non-skid as it is possible to make a tire. "Quaker" tires are built to deliver mileage, to stand up under the hardest kind of work, and to give the least trouble to their users.—Quaker City Rubber Co., 629 Market street, Philadelphia, Pennsylvania.

"QUAKER" CORD TIRE

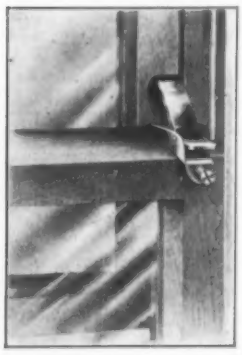
"TOPAZ" RUBBER SPONGE

A gem among rubber sponges is the "Topaz," which is said to be the result of conscientious experiment and effort to produce a sponge surpassing any other aid to thorough body cleansing. It is made of fine quality sponge rubber in the light tan color of the sea sponge, and comes in three sizes. It has a firm, pliant texture, and the large holes are readily washed free from dirt and soapsuds. An interesting test made in a Chicago hospital is said to have demonstrated the superiority in cleanliness of the "Topaz" over sea sponges and wash-cloths. At the end of the test the rubber sponge was comparatively free from bacteria while the sea sponge and the wash-cloth contained many germs.—Featheredge Rubber Co., Inc., Chicago, Illinois.

A RUBBER-SHOD WINDOW CATCH

Almost a necessity in these days of burglaries and petty thieving is the "Burg-La-Proof" window catch which automatically locks any window, open or shut.

This clever device fits over the top of the lower sash and is attached by tightening a screw which makes it fit securely on any width of sash. An automatic spring-controlled binding lever has a rubber tip securely vulcanized over the bent portion of the steel lever which engages the upper sash so that forcing windows only locks them more securely. The rubber tip prevents injury to the woodwork and holds with a tight grip.



"BURG-LA-PROOF" WINDOW CATCH

By using this catch, windows can be left open for ventilation without fear of them being opened by thieves or by venturesome children. It provides a factor of safety in the home incommensurate with the small cost of the article. No tools are required for installing this device, the slot of the fastening-screw being of sufficient width to accommodate a coin, case-knife or key, if a screw-driver is not available. This catch is made in two sizes, regular and large.—Burg-La-Proof Window Catch Manufacturing Co., Everett, Massachusetts.

FOUNTAIN PEN WITHOUT INK SAC

The newest type of fountain pen has been devised without the usual ink sac. Instead there is a "little red pump handle" that does away with side levers, compression rods, and rubber sacs, and operates, as its name indicates, on the principle of the good old-fashioned pump. As a result, the barrel of this pen will hold considerably more ink than the ordinary fountain pen. At the same time, the usual claims are made as to its being non-leakable and self-cleaning. Besides the gold pen, there are only four other simple parts, all of which are made of hard rubber. A portion of the pen here pictured is cut away to show the pump.—Dunn-Pen Co., 709 Sixth avenue, New York City.

CONSTRUCTION OF THE DUNN-PENN

DOUBLE DISK WHEEL WITH FIRESTONE TIRE RIM

The trim appearance of a motor car equipped with disk wheels appeals to many an owner and prospective purchaser. One of the pioneers in this line is the "Indestructible" pressed steel, double disk wheel, which has been developed through eleven years of experimentation by its manufacturer. Its method of construction insures maximum strength with minimum weight. Road shock is taken up and dissipated through the entire circumference of the wheel as the circular triangle bracing principle of the sheets in the wheel counteracts and absorbs these forces. The disks are flanged with long flanges which are riveted to the felloe band, each supporting and strengthening the other. The "Indestructible" wheel provides for the use of the standard Firestone demountable rim. The valve stem in this wheel comes through at the back of both sheets and is in an indentation in the sheet so that the inflating nozzle can be applied easily. Owing to the symmetrical lines this wheel is very easy to keep clean.—Indestructible Wheel Co., Lebanon, Indiana.

INSIDE VIEW, "INDESTRUCTIBLE" DOUBLE DISK WHEEL

NOVEL BRITISH INNER TUBE

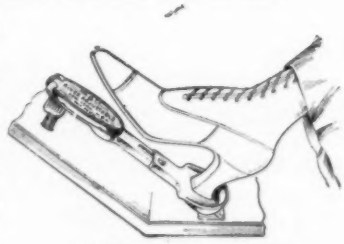
A puncture proof inner tube with novel features is a recent British invention. It is much smaller than the inside of the cover and is expanded to fit by a pressure of 30 pounds to the square inch. The walls of the tube are considerably thickened to resist the strain, and the tube takes much of the pressure that usually is carried by the cover. It is claimed that the working pressure of the cover used with this tube is only 55 pounds, whereas the usual average is computed at 75 pounds. With the tube inflated by 30 pounds pressure only 25 pounds is left for the cover to sustain.

"PRESSURELASTIC" INNER TUBE

The extra thickness of the Pressurelastic tube makes it somewhat heavier than the ordinary tube, but it is practically immune from puncture, does not creep, and cannot be nipped when being fitted into the cover. It is said that extensive tests have proved the advantages of this new tube and that it is in large demand by taxi drivers.—Pressurelastic Inner Tube Co., 27 Colonnade, Russell-square, London, W. C.

EXTENSION ACCELERATOR PAD AND HEEL REST

The well-known Rives "Neverslip" auto pedal pads with which a large percentage of American-built automobiles are equipped are now made in an adjustable heel rest combination, as shown in the illustration. The adjustable feature permits accommodation to any size desired and thus ensures full control of the accelerator without discomfort.—George H. Rives, Manufacturing Co., Inc., 2187 Woolworth Building New York City.



"NEVERSLIP" PEDAL PAD

HOLLOW BRICK PRINCIPLE APPLIED TO TIRES

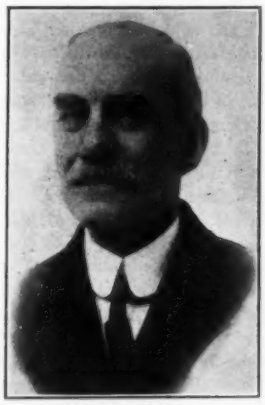
The ceaseless endeavors of inventors to perfect a device that will supersede pneumatic rubber tires brings out daily a number of clever ideas. One which seems worthy of note is the "Triangle" tire core, molded of soft rubber with triangular open portions so arranged as to displace in cross-section an equal amount of rubber throughout the circumference of the core. The triangle is said to be the only known geometrical device that can accomplish this. The maker of this airless tube guarantees the "Triangle" tire core to ride more easily than air, to supply a much greater resiliency, and to make accidents from blowouts impossible.—Triangle Tire Core Co., 1209 Grand avenue, Des Moines, Iowa.

TRIANGLE TIRE CORE

THE OBITUARY RECORD

A PIONEER IN RUBBER SUNDRIES

WORD comes from Columbus, Ohio, of the passing of one who was one of the well-known Eastern rubber men, who became in time a resident of the Middle West.



ALBERT T. HOLT

The record of achievement of Albert Thompson Holt is most interesting. Born in Andover, Massachusetts, educated in the public schools, he entered the employ of the Tyer Rubber Co. at the age of 17 years. Later he became superintendent of the Davol plant in Providence, Rhode Island. After two years he took charge of the Brooklyn factory of C. B. Dickinson. Becoming interested in rubber reclaiming, he associated himself with Loewenthal & Morganstein, at Jersey City, having charge not only of manufacture but of marketing as well. In his travels he became struck with the development of the rubber business in Ohio, and first entered the specialties department of The B. F. Goodrich Co., then took charge of the plant of the Victor Rubber Co., and finally settled in Columbus as consulting rubber expert.

Mr. Holt was a thoroughly equipped and practical rubber man, the inventor of many processes of value and an excellent organizer. Personally, he was dignified, courteous, firm in his convictions, and a tireless worker. An accident in a factory where he was doing expert work brought on heart trouble, which resulted in his death.

FORMER MASSACHUSETTS RUBBER MAN

Barnabas Thacher Morrison, formerly treasurer and general manager of the Reading Rubber Manufacturing Co., Reading, Massachusetts, died at his winter home in Pasadena, California, January 7, after bearing bravely an illness of nearly six years. In 1909 he retired from active business, after having been identified with the rubber trade for twenty-three years, and has since devoted himself to the care of large property interests which came to him partly through inheritance.

Mr. Morrison is survived by his wife, daughter of the late Daniel Demmon, of Boston, and Weston, Massachusetts; by a brother, Philip G. Morrison, and two sisters, Miss Mary G. Morrison and Mrs. George Horace Blake.

FOUNDER OF TWO RUBBER COMPANIES

Dorman T. Warren, founder of the Gutta Percha & Rubber Manufacturing Co., New York City, died suddenly, on January 20, at his home, 170 Central Park South, New York City. He was born in West Townsend, Massachusetts, in 1827, and received his education at Andover Academy, Andover, Massachusetts. On graduating, he went to New York and became interested in the jewelry business, where he gained the friendship of the late Amedée Spadone, another jeweller in the same building.

At the close of the Civil War Mr. Warren established the Gutta Percha & Rubber Manufacturing Co. of New York, of which Mr. Spadone became a director and afterward president. In 1887 Mr. Warren organized the Canadian concern of the same name at Toronto, Ontario, now known as Gutta Percha & Rubber, Limited. In time, however, the New York and Toronto companies became entirely distinct, Mr. Warren relinquishing all interest in the former and Mr. Spadone in the latter. In 1892 Mr. Warren retired from the Canadian firm and his son, the late Henry D. Warren, became head and guiding spirit of the business. On the latter's death in 1909, his son, Captain Trumbull Warren, served as president and treasurer until killed in action overseas in 1915. Mrs. S. T. Warren is now president of the company.

Dorman T. Warren was a member of the New York Board of Trade and the Chamber of Commerce. He is survived by two sons, Professor Howard C. Warren of Princeton University, and Ralph H. Warren of Montclair, New Jersey.

PROMINENT AKRON MANUFACTURER

William Franklin Warden, president of The Burt Manufacturing Co., and also vice-president of the Akron Gear & Equipment Co., both of Akron, Ohio, died of acute heart trouble at De Land, Florida, on January 19, 1921.

Mr. Warden was born in North Robinson, Ohio, February 23, 1874, and received his education at the Soldiers' & Sailors' Orphans' Home, Xenia, Ohio. His first work was with a printing concern in Chicago. Later he was employed on *The Wadsworth Banner*, and for the past thirty years has been connected with The Burt Manufacturing Co. as president. He was also president of The Burt Building Co. and vice-president of The Akron Gear & Engineering Co.

Mr. Warden was a member of the Akron Chamber of Commerce, Portage Country Club, De Land Golf Club of De Land, Florida, and a member of the Grace Reformed Church.

Interment was at Wadsworth, Ohio, the body being accompanied by the widow, his elder son, William, and Mr. Warden's brother-in-law, E. O. Curry, of Wadsworth.

Mr. Warden's death comes as a great shock to a large circle of friends and he will be sadly missed by his business associates.

THE EDITOR'S BOOK TABLE

"RUBBER GOODS MANUFACTURE." BY "FACTORY MANAGER." Maclaren & Sons, Limited, London, 1920. Cloth, illustrated, 496 pages, 6 by 9½ inches.

THIS WORK embraces 28 chapters, which appeared originally as a series of articles published in *The India-Rubber Journal*, London. The early chapters treat of factory location, plans, equipment and the various departmental divisions of the manufacturing operations. A special chapter is devoted to the discussion of the machinery and other equipment employed for each line of goods, the making of which is described in detail. In these chapters also are given many typical formulas for the rubber mixings employed.

The last two chapters are devoted to factory management and costing, followed by a series of ten appendices that treat on a variety of matters, such as compounding ingredients, milling, calendering, vapor cure, molding of heavy springs and the manufacture of miscellaneous articles.

The book is furnished with a very full index, which is a convenience always appreciated in a reference work. The subject matter details English rubber factory practice, which in many respects is much different from American methods.

"CREATIVE CHEMISTRY." BY EDWIN E. SLOSSON, M.S., PH.D., The Century Co., New York, 1920. Cloth, illustrated, 311 pages, 5½ by 8 inches.

This book is one of "The Century Books of Useful Science." The wonderful story of scientific discovery and development in the varied departments of industrial chemistry is clearly and most entertainingly told in untechnical language for the instruction of the layman interested to learn what civilization owes to the chemist.

The rubber worker will be particularly interested in the chapter on rubber, in which is sketched the chemistry of rubber, the discovery of synthetic rubber, the development of plantation rubber, vulcanization, and the future possibilities dependent on cheap raw rubber.

"POCKET DIRECTORY OF SHOE MANUFACTURERS, 1921." THE Shoe and Leather Reporter Co., 166 Essex street, Boston, Massachusetts. Leather, 340 pages, 2¾ by 5½ inches.

This handy pocket volume contains the latest information concerning the shoe manufacturers of the United States and Canada, giving location of factories, members of firms, capitalization, names of buyers and superintendents, days on which buyers see salesmen, capacity of plants, and many other important details; also specially drawn maps showing the relative location of shoe manufacturing towns. It includes in one small volume that can easily be carried in the pocket all necessary information about the great and prosperous shoe trade of this continent. The 1921 edition has been carefully revised from original sources.

"HOW TO KEEP INVENTION RECORDS." BY HARRY A. TOULmin, Jr., J. D., Litt. D., with introduction by James T. Newton, a former United States Commisioner of Patents. D. Appleton & Co., New York City. Cloth, 85 pages, 5 by 8 inches.

This little volume on the keeping of invention records is of great value to inventors. The first part discusses the general nature of industrial property and monopolies granted to protect it. The second part presents a practical method of insuring the recording of dates, and a final chapter deals with methods of patent investigation. Failure to keep adequate records of inventions and their development and reduction to practice has often deprived inventors of the fruits of their ideas and labor, and has cost thousands of dollars in litigation that might have been avoided had the inventor used some such recording system as outlined in this volume.

A DICTIONARY OF CHEMICAL TERMS, By JAMES F. COUCH. New York, 1920. D. Van Nostrand Co., New York City. Flexible cloth, 204 pages, 5 by 7 inches.

This volume of pocket size is designed by its author, who is a chemist in the Bureau of Animal Industry, United States Department of Agriculture, to serve the convenience of anyone who has occasion to read chemical literature. Examination of the book shows that the author has attained this object very successfully. His work merits appreciation of chemists and students alike for the concise and accurate definitions presented in the book.

NEW TRADE PUBLICATIONS

THE YARNALL-WARING CO., CHESTNUT STREET, PHILADELPHIA, Pennsylvania, manufacturer of "Yarway" power plant devices, has issued a leaflet describing the Yarway Junior seatless valve, which has recently been developed to meet the need for a valve that would stay tight under high pressure steam on turbine drips, superheater drains, water columns, blow offs, etc. Copies of the descriptive sheet will be sent free upon request to the maker.

THE BOONTON RUBBER MANUFACTURING CO., BOONTON, NEW JERSEY, maker of molded material for electrical insulations and for mechanical, chemical and other purposes, has issued a 48-page booket, attractively bound in leather-colored pebbled cardboard covers, embossed with the company's trade-mark and stamped and bordered with brown. The subject matter treats of the company's products, giving a brief but comprehensive classification of molded material, useful data on molded insulation, etc. Especially beautiful and in a class by themselves as illustrations of mechanical processes, are the eleven full-page half-tones of workmen at various machines, enlarged from photographs to give the soft-focus effect so familiar on the screen. The printing and presswork of the booklet are also to be commended.

THE BIRMINGHAM IRON FOUNDRY, DERBY, CONNECTICUT, HAS issued a large two-color illustrated catalog of its rubber mill machinery, printed on heavy plate paper which clearly shows every detail of the various machines. Besides several full-page views of the plant and its interior, there are forty-seven full-page illustrations of machines, reproduced from photographs, including crackers, washers and sheeters, light and heavy duty mills, refiners, two to four-roll calenders, embossing calenders, experimental machinery, presses, bias shears, tread-making machinery and many others.

The Birmingham Iron Foundry is one of the best-known institutions of its kind in this country, and its long experience makes it an authority on rubber machinery. It is always willing to make suggestions and is able to supply machinery for the manufacture of tires and accessories, boots and shoes, soles and heels, mechanical and molded goods, hard rubber goods, carriage cloth and clothing, asbestos sheeting, etc. Besides the many machines illustrated, the Birmingham company also produces hose-making and cross-wrapping machines, duck slitters, fabric dryers, gutta percha calenders and washers, mixing aprons, doubling drums, etc.

The catalog is substantially bound in heavy paper covers, and is intended to serve as a bulletin to make it easier for clients to prepare their inquiries. Full descriptions and prices of each specific machine will be sent upon request.

UNDER THE NAME, *"Tire Trade Journal and Vulcanizer & Tire Dealer,"* the first issue of these two combined periodicals appeared in January. The Gardner-Moffat Co., 225 Fourth avenue, New York City, has bought the *Vulcanizer & Tire Dealer*, the Chicago publication, first issued in September, 1919, and merged it with its own monthly, *Tire Trade Journal*, the first issue of which was published in July, 1919.

AN ADDRESS, "MAKING THE 1921 GRADE," DELIVERED BY GEORGE M. GRAHAM, vice-president of the Pierce-Arrow Motor Car Co., Buffalo, New York, at the annual meeting of the Motor and Accessory Manufacturers' Association, Hotel Biltmore, New York, January 12, 1921, was an able survey of the national automotive field, a careful analysis of conditions helpful and deterrent to the progress of the motor vehicle industry, and a well-reasoned, stimulating plea for greater optimism. Of especial interest to the tire industry is the testimony he submits to prove that automobile production is still far from reaching the point of saturation, and he prophesies that the country will shortly enter upon an era of motor mileage that will soon equal the total now provided by all-rail and river transportation.

CALENDARS

Tyson Brothers, Inc., Woodbridge, New Jersey, maker of rubber substitute and chemicals for the rubber industry, has presented a very beautiful calendar bearing no advertisement other than the company's name and trade mark inconspicuously stamped beneath the silk cord hanger. The calendar bears a hand-colored print after the original water color "Our Daily Bread," by Edwin Lamasure, which shows a golden wheat-field stretching back to a group of farm buildings set beneath fine old green trees. It is a typical representation of the peace and plenty that characterizes our great land, in spite of the business flurries and anxieties that prevail at times in crowded centers.

A daily date calendar with tear-off leaves bearing extra large size figures has been presented to the trade by the Stamford Rubber Supply Co., Stamford, Connecticut, maker of rubber factice.

The Buffalo Foundry & Machine Co., Buffalo, New York, maker of the "Buflovak" line of special machinery, has sent out a 1921 calendar pad, fitted with an adhesive strip at the back to enable it to be fastened to the calendar presented by the company last year.

David Bridge & Co., Limited, Castleton, Manchester, England, the well-known British engineers and rubber machinists, have sent out an attractive calendar bearing a reproduction of a drawing by W. Alister MacDonald of the Old Shambles, Market Place, Manchester. Its quaint half-timbered houses with many-gabled roofs and small-paned bow windows are reproduced in soft colors.

REPAIRING RUBBER FOOTWEAR IS FULLY DESCRIBED IN THIS ISSUE.

News of the American Rubber Industry

THE GOODYEAR REFINANCING PLAN

AFTER several weeks of negotiation between The Goodyear Tire & Rubber Co., Akron, O., and representatives of its creditors and its stockholders, a plan for the readjustment of the debt and capitalization of the company has been agreed upon. The plan contemplates the issue of approximately $25,000,000 first mortgage 20-year 8 per cent sinking fund bonds, $25,000,000 10-year 8 per cent sinking fund debentures and $35,000,000 8 per cent prior preference stock.

The bonds and debentures, or their proceeds, will be used to pay off the bank debt, which is largely secured, and for other corporate purposes, including new working capital. General creditors will receive prior preference stock for existing debt and in part payment for future deliveries of materials. Holders of existing preferred stock will receive preferred stock of the reorganized corporation having substantially the same rights and preferences as the present preferred stock, share for share, and holders of existing common stock will receive common stock of the reorganized corporation, which will probably be without par value, share for share. The $25,000,000 of debentures, together with 250,000 shares of common stock, and also the $35,000,000 prior preference stock, are to be offered for subscription to existing stockholders.

The plan will be carried out under the supervision of a bank creditors' committee, composed of Robert C. Schaffner, Chicago, Illinois; John Sherwin, Cleveland, Ohio; and Ralph Van Vechten, Chicago, Illinois; a merchandise creditors' committee composed of W. E. Bruyn, New York City; F. L. Jenckes, Providence, Rhode Island; and Myron C. Taylor, New York City; a preferred stockholders' committee composed of George W. Crouse, Akron, Ohio; Reamy E. Field, Cincinnati, Ohio; Charles A. Morris, Cleveland, Ohio; A. H. Scoville, Cleveland, Ohio; and J. Herndon Smith, St. Louis, Missouri; and a common stockholders' committee composed of Fred S. Borton, Cleveland, Ohio; C. R. Erwin, Chicago, Illinois; E. E. Mack, Canton, Ohio; Russel L. Robinson, Akron, Ohio; and F. A. Seiberling, Akron, Ohio.

In order to satisfy those who are to furnish the new money and accept prior preference stock for existing indebtedness as to the future management of the company, provision satisfactory to the merchandise creditors' committee is to be made for the future election of directors.

The refinancing plan agreed upon is based upon a present debt, exclusive of interest, of $65,964,290 including bank indebtedness, merchandise indebtedness and contingent obligations. Present commitments for future deliveries of merchandise on which specifications and prices have been fixed total $54,959,503 of which $7,200,740 is for rubber, $5,664,000 is for cotton, $41,879,763 is for cotton fabric, and $215,000 is for other materials. The company's estimate for depreciation covered by commitments not heretofore written off is $18,247,000.

The approximate present capitalization of the company is $65,000,000 eight per cent preferred stock and $61,000,000 common stock. Treating the capital stock as a liability at its par value, the estimated deficit on December 31, 1920, exclusive of loss upon commitments for merchandise not yet delivered, was approximately $24,400,000. For indebtedness existing January 1, 1921, merchandise creditors will receive 125 per cent of the amount in prior preference stocks. For future commitments, that is after January 1, 1921, merchandise creditors will receive 75 per cent in cash, payable not later than the 10th of the month following shipment from American point of shipment, and 28 per cent of the amount in prior preference stock to be delivered upon the consummation of the plan of readjustment. Carrying charges with reference to such commitments will be paid in cash, but dividends accrued to date of delivery of materials on stock delivered against commitments will, when paid, be credited on such charges.

Contingent creditors holding obligations upon which the company is secondarily liable will receive certificates evidencing their rights. Upon the release of the company from its liability to such creditors there will be deposited with a trustee as security for the payment of such obligations—on or before April 1, 1922, if they mature prior to that date, or at maturity if they mature later—125 per cent of the principal amount thereof in prior preference stock, the holders of such obligations to have the option to exchange them at any time prior to maturity for the prior preference stock so deposited.

The negotiations leading up to the plan have developed a spirit of cooperation by all parties in interest to preserve the valuable good will which the company has built up through the excellence of its product and the efficiency of its sales organization. It is believed that if assented to by the creditors with substantial unanimity and by the requisite proportion of the stockholders, the plan will not only save the company from its present embarrassment, to the advantage of its creditors as well as itself, but will also put it upon a sound financial basis for future operations. The company has assurances from strong banking interests which it believes justify the expectation that if the necessary assents of creditors and stockholders are forthcoming the bonds and debentures can be underwritten and the plan consummated. Holders of a majority of the common stock and the largest creditors have already indicated their assent.

The proposed stockholders' meeting called for final authorization of this plan was again postponed from February 11 to March 4, owing to inability of the committees to complete arrangements for putting the plan into operation.

The loan of $18,825,000, which was arranged several months ago by a banking syndicate, headed by Goldman, Sachs & Co., for The Goodyear Tire & Rubber Co., and which matured on February 15, has been extended for thirty days, with an option for a further extension of sixty days.

FINANCIAL NOTES

PRELIMINARY REPORT OF THE UNITED STATES RUBBER CO.

Owing to the unusual prevailing business conditions the United States Rubber Co. has issued to stockholders a detailed preliminary statement in advance of the customary annual report in April, showing the volume of business and profits for the year 1920 and the position of the company at the close of that period. Net sales amounted to $255,744,685, an increase of $30,155,220 over 1919, the best previous year. Net profits were $21,275,524, equivalent, after preferred dividends, to $19.82 a share on the $81,000,000 common stock, against $17.59 a share in 1919 on the $72,000,000 common stock then outstanding.

The following table shows the principal items of the income accounts for 1919 and 1920:

	1920	1919
Net sales	$255,744,685	$225,589,465
Net income after depreciation and taxes	26,925,173	21,396,099
Interest	5,649,649	3,665,862
Net profits	21,275,524	17,730,237
Preferred dividends	*5,200,000	5,041,476
Subsidiary companies' dividends	18,718	19,567
Common dividends	*6,480,000	2,098,576
Surplus	9,576,806	10,570,618
Credit adjustments	460,258	108,506
Total profit and loss surplus	†53,247,227	52,310,263

*Including dividends payable January 31, 1921.
†After deduction of $9,000,000 stock dividend paid February 19, 1920.

Inventories have been written down $11,020,605, the reserves created in past years being adequate to effect this shrinkage without using any part of the income for 1920 for the purpose.

However, the directors will consider the advisability of appropriating to reserves a sum, not exceeding $6,000,000 from the net surplus for the year 1920.

A substantial part of the inventory shrinkage applies to cotton fabrics made to the company's own specifications and necessarily ordered well in advance. On the basis of fairly normal business all contract fabrics will soon be consumed. The company has had no forward contracts for crude rubber and has taken advantage of prevailing low market prices. At the close of the year there was on hand and subject to delivery about seven months' supply at an average cost of 26.79 cents per pound, making it unnecessary to write off anything on account of crude rubber. A short inventory position on all other materials and supplies has enabled taking advantage of declining prices, with the result that inventories are considered fair on the basis of the prevailing market. Discounts for prompt payment of purchase invoices have substantially exceeded the interest paid on current borrowing.

Chairman Samuel P. Colt points out that with the fall in prices of materials and supplies, inventories should come down and current borrowing be proportionately reduced. Operations for the year 1921 will obviously get the benefit of writing down inventories, and while, owing to general business conditions, the present outlook is not what it was a year ago, there are signs of improvement in trade, and considering the large and diversified product of the company it is believed that earnings will be satisfactory to stockholders. The larger part of the new construction laid out prior to 1920 has been completed and paid for so that no additional expansion of fixed properties will be necessary for some time.

The chief items of the preliminary general balance sheet as of December 31 for the years 1919 and 1920 are as follows:

	1920	1919
Current assets	$195,505,243	$161,875,057
Total assets	389,245,980	319,534,204
Current liabilities	66,425,626	24,332,718
Total liabilities	153,452,426	92,139,718
Reserves	29,459,852	33,074,447
Capital stock	146,277,200	135,300,600
Surpluses	60,056,502	59,019,438
Total liabilities, reserves and capital	389,245,980	319,534,204

DIVIDENDS DECLARED

Company	Stock	Rate	Payable	Stock of Record
American Chicle Co.	Pfd.	1½% q.	Apr. 1	Mar. 19
Brunswick-Balke-Collender Co.	"A" Com.	1¼% q.	Feb. 15	Feb. 5
General Electric Co.	Com.	$2 q.	Apr. 15	Mar. 9
Goodrich, B. F. Co., The	Pfd.	1¾% q.	Apr. 1	Mar. 22
Hood Rubber Co.	Pfd.	1¾% q.	Mar. 1	Feb. 21
Miller Rubber Co., The	Pfd.	2% q.	Mar. 1	Feb. 10
Rub-Tex Products, Inc.	Pfd.	7% an.	Feb. 1	.....
Tyer Rubber Co.	Pfd.	$1.50 q.	Feb. 15	.....

AKRON RUBBER STOCK QUOTATIONS

The following are closing quotations of February 17, supplied by The App-Hillman Co., Second National Building, Akron, Ohio:

	Bid	Asked
American R. & T. Co., com	40	65
Amazon Rubber Co., The	..	45
Firestone T. & R., Com	79	83
Firestone T. & R., 6% pfd	84	87
Firestone T. & R., 7% pfd	80	83
General T. & R. Co., The, com	180	205
General T. & R. Co., The, 7% pfd	80	85
Goodrich, B. F., The, com	39	39½
Goodrich, B. F., The, pfd	82	83
Goodrich, B. F., The, 5-yr. 7% notes	90	90¼
Goodyear T. & R. Co., The, com	13	13¼
Goodyear T. & R. Co., The, 7% pfd	30½	31
India T. & R. Co., com	100	130
India T. & R. Co., 7% pfd	..	80
Mason T. & R. Co., The, com	17	20
Mason T. & R. Co., The, 7% pfd	64	66
Marathon T. & R. Co., com	3	4
Miller Rubber Co., The, com	84	85
Miller Rubber Co., The, 8% pfd	86	87
Mohawk Rubber Co., The	140	152
Portage Rubber Co., The, com	17	19
Portage Rubber Co., The, 7% pfd	..	42
Republic Rubber, com	¾	1
Republic Rubber, 7% pfd	..	30
Republic Rubber, 8% pfd	9	11
Rubber Products Co., The	..	100
Star Rubber Co., com	..	100
Star Rubber Co., 8% pfd	..	100
Swinehart T. & R., com	30	40
Swinehart T. & R., 7% pfd	..	70
Phoenix Rubber Co., com	..	18
Phoenix Rubber Co., pfd	..	88
Standard Tire Co., com	..	100
Standard Tire Co., pfd	..	90

NEW YORK STOCK EXCHANGE QUOTATIONS

FEBRUARY 24, 1921

	High	Low	Last
Ajax Rubber Co., Inc	28½	25⅛	25⅛
The Fisk Rubber Co	14⅛	14	14
The B. F. Goodrich Co	36¼	34½	35⅞
The B. F. Goodrich Co., pfd	78	78	78
Kelly-Springfield Tire Co	44	39	39⅛
Kelly-Springfield Tire Co., pfd	..	..	..
Keystone T. & R. Co., Inc	15½	14⅞	15⅛
Lee R. & T. Corp	20¾	20¾	20¾
United States Rubber Co	68¼	65⅞	66⅛
United States Rubber Co., 1st pfd	..	..	..

NEW INCORPORATIONS

Acme Mfg. Corp., February 15, 1921 (New York), $15,000. L. B. Wishnevsky, 422 Lenox Road; L. N. Larson, 4814 New Utrecht avenue, both in Brooklyn; W. F. White, 250 West 103rd street, New York City—both in New York. To manufacture auto rims.

Armorcord Co., Inc., February 9, 1921 (Maine), $100,000. D. O. Campbell, president and treasurer; J. H. Hudson, clerk—both of Sangerville, Maine. Principal office, Sangerville, Maine. To manufacture and repair automobile tubes and tires.

Asiatic Rubber Import Corp., January 28, 1921 (New York), $25,000. A. Marcus, 912 Tiffany street; D. Kolkin, 943 East 179th street; J. Zalowitz, 35 Norfolk street—all of New York City.

Automobile Tire Co. of California, December 27, 1920 (California), $150,000. H. A. Demarest, Bryson Apts., 2701 Wilshire Blvd.; E. W. Demarest, 2806 Dalton avenue; J. A. Leuthold, 1232 West Fifth street—all of Los Angeles, California. Principal office, Los Angeles, California. To manufacture, buy, sell and deal in rubber tires and tubes, etc.

California Rubber Co., October 1, 1920 (California), $5,000,000. R. L. Brown, president; H. P. Adams, vice-president and treasurer; J. R. Jones, secretary; R. F. Boyles and A. E. Littler, directors—all of 2 Pine street, San Francisco, California. Principal office, Oceanic Building, 2 Pine street, San Francisco, California. To manufacture tubes, tires and rubber goods.

Camp Tire Co., Inc., February 1, 1921 (New York), $20,000. Geo. E., Harold H. and Genevieve H. Camp—all of Utica, New York. Principal office, Utica, New York.

Eagle Belting Corp., February 11, 1921 (New York), $150,000. J. H. Zimon, 749 Fillmore avenue; J. Pryzgucki, 261 Chandler street, both of Buffalo; S. Pryzimski, Post Office Box 478, N. Tonawanda—both in New York. Principal office, Buffalo, New York. To manufacture leather and rubber belting, etc.

Economy Tire Exchange, Inc., December 23, 1920 (New Jersey), $100,000. H. Cohen, 197 Livingston street; H. A. Harrison, 220 Weequahic avenue; H. Setten, 381 Peshine avenue—all of Newark, New Jersey. Principal office, 9-15 Clinton street, Newark, New Jersey. Agent in charge, M. Rashkes. To deal in tires and automobile accessories of every kind.

Ellicott Tire & Repair Co., Inc., February 3, 1921 (New York), $20,000. Leonard S. and W. Kenneth Allen, 320 Sumner street; T. R. Wheeler, 170 Anderson Place—both of Buffalo, New York. Principal office, Buffalo, New York. To repair automobile tires.

Eskridge Tire Co., October 18, 1920 (Maryland), $100,000. D. R. Eskridge; M. R. Robinson; I. Michaelson; F. Caplan. Principal office, 868 N. Howard street, Baltimore, Maryland. To purchase and sell tires of all kinds.

Hansen Wind Shield Cleaner Co., February 7, 1921 (New York), $300,000. H. P. Hansen; W. E. Caldwell; H. Bjornwaldo—all of 25 Park avenue, New York City.

Ibex Rubber Corp., February 7, 1921 (Delaware), $125,000. G. O. Smalley, Bound Brook; W. F. Jennings, Plainfield—both in New Jersey; H. J. Lindsley, Detroit, Michigan. To manufacture rubber and rubber products.

Lockwood Tire & Mfg. Corp., February 18, 1921 (Delaware), $2,500,000. O. M. Lockwood; H. J. Clay; R. Becker—all of Buffalo, New York. To manufacture tires.

Manhattan Tire Corp., February 3, 1921 (New York), $75,000. W. Beaney, 144 West 54th street; E. Antkes, 701 Seventh avenue; R. A. Wicksel, 15 East 40th street—all of New York City. To manufacture automobile tires.

Master-Craft Fountain Pen Corp., February 7, 1921 (New York), $250,000. M. E. and I. H. Heilbrun; A. A. Flescher—all of 59 Park Place, New York City. To manufacture fountain pens.

Nu-Air Tire & Rubber Corp., February 8, 1921 (Delaware), $1,000,000. T. L. Croteau; M. A. Bruce; S. E. Dill—all of Wilmington, Delaware. To manufacture tires.

O. C. T. Sectional Tire & Rubber Co., February 8, 1921 (Delaware), $1,000,000. J. B. O'Connor; L. T. Atwater; S. L. Carter—all of Kansas City, Missouri. To manufacture and sell pneumatic tires.

Philadelphia Vulcanizing Machine & Rubber Co., January 27, 1921 (Delaware), $50,000. R. Satterthwait; M. Daniel; M. Kosher—all of Philadelphia, Pennsylvania. To manufacture tires and tubes.

Red Raven Rubber Co., January 26, 1921 (New Jersey), $62,750. J. H. Dwork; A. Freedman; D. Feingold—all of 152-158 Sussex avenue, Newark, New Jersey. Principal office, 152-158 Sussex avenue, Newark, New Jersey. Agent in charge, J. H. Dwork. To manufacture, buy, sell, export all kinds of rubber tires and tubes, etc.

Watertown Steam Vulcanizing Works, Inc., February 11, 1921 (New York), $25,000. E. B. Salmon, Jr.; C. J. Grabosky; G. W. Fox—all of Syracuse, New York. Principal office, Watertown, New York. To repair tires.

Wids Co., The, January 20, 1921 (Massachusetts), $300,000. B. Sanderson; H. L. F. Kreger; R. B. Wigglesworth; W. S. Felton; B. Harwood; E. T. Connolly—all of 84 State street, Boston, Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in rubber products, etc.

Wonder Garter Co., January 7, 1921 (Massachusetts), $100,000. J. J. Moore, Hingham; A. P. Watson, 105 Middle street, Braintree; J. Kelley, 342 Washington street, Weymouth—all in Massachusetts. To manufacture and deal in furnishing goods of all kinds including garters, supporters, elastic goods, webbing, etc.

PERSONAL MENTION

James Newton Gunn, president of the United States Tire Co., 1790 Broadway, New York City, has been elected president of the Lincoln Highway Association, to succeed F. A. Seiberling, recently resigned. As one of the directors and founders of the Lincoln Highway Association, Mr. Gunn has long been in close touch with the aims of the organization to stimulate interest in highway development. An "ideal section" somewhere along the highway will be constructed and maintained by the United States Rubber Co.

Louis V. Keeler, formerly with J. Frank Dunbar, is now with E. G. Curry & Co., Inc., crude rubber broker, Woolworth Building, New York City.

R. J. Firestone, whose connection with the rubber industry has made him well known throughout the country, has been elected a vice-president of the United States Motor Truck Co., Cincinnati, Ohio.

John J. Braham, Jr., Brooklyn, New York, formerly with the sales department of The Keystone Tire & Rubber Co., Inc., has become a member of the selling force and been elected a vice-president of the Delion Tire & Rubber Co., Baltimore, Md. He will have his headquarters at the company's branch at 203 West 72d street, New York City.

W. F. Roberson, for several years an instructor in the Miller School of Tire Repairing, Akron, Ohio, has been appointed manager of the Legion Schools Association, Brooklyn, New York.

E. H. Wilson, president of the Dural Rubber Corporation, Flemington, New Jersey, has been appointed representative of The Rubber Association of America on the Motor Vehicle Conference Committee for New Jersey.

A PROMINENT RUBBER COMPANY EXECUTIVE

JOHN D. CARBERRY, assistant secretary and assistant treasurer of the United States Rubber Co., has been with that company since its organization in 1892, and his official connection with numerous subsidiary and other companies offers eloquent testimony to his marked ability as a corporation executive.

JOHN D. CARBERRY

He was born in Troop, New York, on January 16, 1869, and received his education at the Port Byron Free School and Academy and Albany Business College, from which latter he graduated in 1889.

In 1890 he began his business career as a stenographer to Charles E. Bush, president of the First National Bank, Orwell, Vermont, and treasurer of the Ticonderoga Pulp & Paper Co. In 1892 he acted as secretary to the appraisement committee during the formation of the United States Rubber Co., and after the company was organized was employed as stenographer to the president and secretary. In 1903 he was elected assistant secretary of the company, which office he still holds. In 1907 he was elected secretary to the president, and in 1919 resigned this office to become assistant treasurer.

Mr. Carberry is also an officer or director in the following companies: American Commerce Co., American Dunlop Tire Co., Joseph Banigan Rubber Co., Eureka Fire Hose Manufacturing Co., G. & J. Tire Co., General Rubber Co., General Rubber Co. of Brazil, Goodyear's India Rubber Glove Manufacturing Co., Goodyear's Metallic Rubber Shoe Co., The Hartford Rubber Works Co., Hastings Wool Boot Co., India Rubber Co., Lycoming Rubber Co., Marvel Rubber Co., Meyer Rubber Co., Morgan & Wright, National India Rubber Co., Naugatuck Chemical Co., New Brunswick Rubber Co., Revere Rubber Co., Rubber Regenerating Co., Shoe Hardware Co., U. S. Rubber Export Co., Limited, United States Tire Co., Woonsocket Rubber Co., and ten lumber, water power and other development companies.

He is a member of the following clubs and societies: Crescent Athletic Club of Brooklyn, New York; New York Athletic Club; Lotus Club, New York; Brooklyn Institute of Arts and Sciences; Cayuga Society in New York; Champlain Association; Vermont Society in New York.

CLARENCE H. LOW—BONDS AND INVESTMENTS

CLARENCE H. LOW, familiar in rubber circles as secretary of the United States Rubber Reclaiming Co., has recently retired from active connection with the rubber industry to associate himself with the bond and investment department of Halle & Stieglitz, 30 Broad street, New York City. Mr. Low will continue as a director of the United States Rubber Reclaiming Co. and of the Madison Tire & Rubber Co. He is also president of the National Chain Co., College Point, New York.

CLARENCE H. LOW

Mr. Low is a native New Yorker, born in New York City in 1885. He spent three years in the banking house of Ladenburg, Thalmann & Co., the prominent Broad street financial concern, and in 1906 became interested in the rubber industry and entered the Buffalo factory of the New York Rubber Reclaiming Co., later becoming secretary of the company.

In social circles Mr. Low is a prominent and popular member of the Harmonie Club, the Sunningdale Country Club, the Uptown Club and the American Iron and Steel Institute. He goes in enthusiastically for athletics and is recognized as an expert tennis player and a clever boxer.

THE RUBBER TRADE IN THE EAST AND SOUTH

By Our Regular Correspondent

THE NEW YORK RUBBER COMPANY

THE NEW YORK RUBBER CO., 84-86 Reade street, New York City, is this year celebrating the seventieth anniversary of its corporate existence. The company was incorporated under the laws of the State of New York, August 9, 1851, by John Greacen, Jr., Benjamin Franklin Lee, and Charles Dutch. The familiar trade name "Wiccapee" has been used on its products since the incorporation of the company.

The New York Rubber Co., perhaps more than any other in the rubber industry, has what might be termed a solid organization. The office staff has seldom been changed except by the death of a member. At one time the combined service in the company of 13 employes and officials was 324 years. The New York offices have remained in the same location, 84 Reade street, for an unusually long period. The Chicago branch is located at 323-325 West Randolph street.

In 1858 William H. Acken became connected with the company and remained with it all the rest of his life. Within ten years after he became associated with the company he was appointed treasurer, and in 1883 succeeded to the presidency, which he held until his death, January 11, 1906. The office was then filled by John P. Rider, who had been successively secretary and vice-

president. Mr. Rider continued as chief executive until 1911, when he resigned because of advancing years. He was succeeded by John Acken, son of the former president, who still remains in office. Other officers are Henry Montgomery, vice-president and secretary, and Henry F. Hering, 2nd vice-president.

The factory of the New York Rubber Co. was located for many years at Matteawan, New York. In 1917 an addition to the plant was begun at Beacon, New York and in 1919 the mechanical goods department was removed from Matteawan to Beacon. There are few things in the way of rubber specialties that the company does not manufacture. Its factories are located in the heart of a hat manufacturing district and one of its specialties is the production of rubber bags, flanges and blocks for hat makers.

PLANT OF THE NEW YORK RUBBER CO., BEACON, NEW YORK

In 1917 the capital stock of the company was increased from $300,000 to $500,000 to meet the demands of constantly increasing business. The company has now arrived at the advanced age of three-score years and ten with more than youthful vigor and with prospects bright for an unlimited continuance of success.

NEW YORK NOTES

The New York offices of the Hope Webbing Co., Pawtucket, Rhode Island, manufacturers of narrow woven and braided fabrics, are located in the Fourth Avenue Building, 381 Fourth avenue, New York City, where it has on display practically all of its forty-six thousand patterns.

Guy H. Noble has been appointed assistant manager of the New York offices of the H. H. Robertson Co., Pittsburgh, Pennsylvania, which are located at 170 Broadway, New York City. The company manufactures Robertson's mineral rubber and hydrocarbons.

The Walker Webbing Co., with factories in Providence, Rhode Island, and Brockton, Massachusetts, has effected an important consolidation, succeeding DeGraff & Palmer, agents for a number of staple lines of notions, and combining the Townsend Braiding Co., Providence, and the Byron Braiding Co., Lowell, Massachusetts. Among the woven and braided fabrics manufactured in these mills are many different kinds of elastic webbings. The officers of the newly organized corporation are: J. Townsend Walker, president and treasurer; L. F. Howe, vice-president. The directors include: A. C. Weisker, general manager; J. T. Walker, L. F. Howe, F. E. Ringwald, A. L. Palmer, C. P. Holland, Joseph Elmes, Philip S. Mosher and Philip Rising. A. Lincoln Palmer and Frank J. Tynan will continue in charge of the Chicago and Boston offices, respectively. Arrangements to cover the Pacific Coast will be made later. The New York offices, through which correspondence and general direction and selling will be carried on, are at 881 Broadway.

The H. W. Johns-Manville Co., New York City, manufacturer of asbestos products, has changed its name to Johns-Manville, Inc.

The Star Suspender Co., maker of suspenders, garters, arm bands and hose supporters, whose home offices are located at 721-29 Arch street, Philadelphia, Pennsylvania, has opened an office at 256 Church street, New York City.

The recent annual meeting of the Syracuse Rubber Co., Inc., manufacturer of "Syra-Cord" tires, was held at the company's plant at Syracuse, New York. The following directors were elected: E. R. Caldwell, R. L. Caldwell, R. P. Byrne, Frank Shane, J. B. Losey, present general manager; F. G. Mauthe, sales manager, and K. D. Smith, general superintendent. The directors reelected E. R. Caldwell president. Reports by the different officers indicate that the company's technical position compares favorably with that of any other rubber company today, with prospects bright for the coming year and a fine lot of spring orders.

The National Association of Waste Material Dealers, Inc., will hold its annual meeting at the Hotel Astor, New York City, Wednesday, March 16, at 10 A. M. A meeting of the Scrap Rubber Division will be held at the hotel on March 14, at 11 A. M. On the evening of Tuesday, March 15, the eighth annual banquet of the association will be held. It is hoped that there will be a full attendance and members are urged to apply for reservations to the office of the secretary, Charles M. Haskins, Times building, New York City.

The *India Rubber Review*, Akron, Ohio, now has as Eastern manager, Theron R. Lyle, with offices at 23-25 East 26th street, New York City.

CONNECTICUT NOTES

The Kelley Tire & Rubber Co., New Haven, Conn., has changed its name to the Martin Tire & Rubber Co., Inc. The company has taken a contract from James Martin to manufacture Martin cord tires under his specifications. Mr. Martin has bought an active interest in the company and has been elected president to succeed Edward J. Kelley, who has resigned because of failing health. The new factory is expected to be in operation about March 1.

PENNSYLVANIA NOTES

The L. H. Gilmer Co., manufacturer of machinery belting and other woven products, whose main office and factory is located at Tacony, Philadelphia, has sold its plant at Allentown, Pennsylvania, and moved the machinery to its factory at North Wales, Pennsylvania, which has been expanded to accommodate the added equipment.

The Rubber Association of Philadelphia has elected the following officers for the ensuing year: president, William F. Metzger, Quaker City Rubber Co.; vice-president, C. D. Garretson, Electric Hose & Rubber Co.; treasurer, Jacob R. Baltz, William M. Moore Co., Inc.; secretary, Daniel P. Morgan, Trenton. The following were elected as additional members of the executive committee: F. L. Bacon, Gustin-Bacon Manufacturing Co., John Kearns, Lee Tire & Rubber Co.; A. B. Means, United States Rubber Co. of Pennsylvania; H. D. Worthington, Hewitt Rubber Co. of Pennsylvania. A drive is being made to secure new members, residents of Delaware and New Jersey being eligible as well as those connected with rubber companies in Pennsylvania.

S. L. Warner has resigned as vice-president and general manager of The National Tire & Rubber Co., East Palestine, Ohio, to accept an executive position with the Robinson Clay Products Co., Clearfield, Pennsylvania.

The officers of the Pennsylvania Rubber Co., Jeannette, Pennsylvania, elected at a recent meeting, are: Charles M. Du Puy, president; Seneca G. Lewis, vice-president and general manager; George W. Daum, assistant general manager; A. H. Price, treasurer; C. G. Morrill, assistant treasurer; George W. Shiveley, secretary; James Q. Goudie, general sales director; H. H. Salmon, purchasing agent. Herbert Du Puy is chairman of the board of directors.

SOUTHERN NOTES

The DuBois Rubber & Tube Co., Chattanooga, Tennessee, is erecting a two-story brick and steel tire plant, 80 by 160 feet, to cost in excess of $220,000, including machinery. A power house, 42 by 48 feet, will be erected, to be used for steam purposes only. The initial output will be 500 tires and 500 tubes per day. The general offices of the DuBois Rubber & Tube Co. are at 1121-23 Hamilton National Bank building, Chattanooga, and the officers include M. N. Whitaker, president; L. H. Lightfoot, vice-president; K. G. Whitaker, secretary and treasurer. W. L. McLane is production superintendent, and is in charge of erection of the plant and installation of machinery.

The Virginia Carolina Rubber Co., Richmond, Virginia, has increased its capital to $500,000, and has taken bids for the first unit of its new plant, comprising a one-story building, 50 by 245 feet. It will also erect a machine shop for general repair, manufacture of parts, and similar work.

The Cord Tire Corporation, Chester, West Virginia, has added E. H. Hall and M. Harrison to the directorate, which includes also I. E. Fair and the officers, J. D. Comstock, president; H. J. Powers, vice-president, and H. B. Woodbury, secretary and treasurer.

THE RUBBER TRADE IN NEW JERSEY

By Our Regular Correspondent

TRENTON NOTES

THE RUBBER MANUFACTURERS of Trenton believe that the rubber business has reached its crisis and will begin to pick up in a short time. The Bergougnan Rubber Corporation has resumed operations and for the present a force of 125 hands is at work, the output being 75 per cent of normal. Expectations are that within a short time the present force will be increased to 200. The company has taken advantage of the suspension of activities by completing the erection of new buildings and installing the necessary machinery. The new building includes a modern cafeteria and other features contributing to the welfare of the employes.

The Grizzley Rubber Co., of which Richard R. Rogers, is the head, has opened an establishment on Perry street, Trenton. The company deals exclusively in Braender tires and tubes, having secured the South Jersey agency for these products. Mr. Rogers was for six years connected with the Empire Rubber & Tire Corporation in the compound department and as chief adjuster, and is well known in the tire industry.

John S. Broughton, president of the United & Globe Rubber Co., Trenton, was one of the prominent Masons to attend the institution of the new Forest of the Tall Cedars of Lebanon in New York recently. It was the first lodge of its kind to be instituted in New York state.

Charles E. Stokes, vice-president of the Home Rubber Co., Trenton, has disposed of his 100-acre farm and summer home at Trenton Junction, and will seek a summer home elsewhere.

Samuel H. Popkin, Trenton, has purchased a half interest in the Free Bridge Motor Co. garage and tire sales establishment at Morrisville, Pennsylvania.

The Woven Steel Hose & Rubber Co., Trenton, held its annual meeting on February 7 and reelected the following officers: John S. Broughton, president; Horace B. Tobin, vice-president; Karl G. Roebling, treasurer; H. B. Skellinger, secretary. Directors elected were: John S. Broughton, Horace B. Tobin, Karl G. Roebling, John H. Janeway and H. Albert Rogers.

E. B. McKay, formerly first vice-president of the Empire Tire & Rubber Corporation, Trenton, has been elected vice-president and general manager of the Inland Rubber Co., of Chicago, Illinois. Mr. McKay has been connected with the Inland Rubber Co., for the past year and a half. He has been identified with the rubber industry for twenty years and is also president and treasurer of the McKay-Grubb Rubber Co., of Minneapolis, Minnesota, jobbers in automobile parts and accessories throughout the Northwest.

Bruce Bedford, president of the Luzerne Rubber Co., Trenton, and Mrs. Bedford have gone to Bermuda, where they have taken a villa for the remainder of the winter season.

The Fay & Youngs Rubber Corporation, with offices at 36 Prince street, Trenton, has filed a certificate of dissolution in the office of the secretary of state at Trenton. Frederick H. Miller was the agent in charge of the company. The company was incorporated some time ago with $350,000 capital to manufacture druggists' sundries, etc., and purchased a plant in East Trenton. The incorporators were M. L. Youngs and C. L. Fay, of Mount Vernon, New York; F. H. Miller and A. H. Youngs, of Trenton. The company has a plant at Barberton, Ohio.

A drive is being made for members of the newly formed Rubber Association of Philadelphia, Pennsylvania. Any one directly engaged in the manufacture or distribution of rubber goods in the states of New Jersey, Pennsylvania and Delaware is eligible. Daniel P. Morgan, 1021 Filbert street, Philadelphia, is secretary.

MISCELLANEOUS NEW JERSEY NOTES

At a meeting of the stockholders of the F. A. Cigol Rubber Co., of Paterson, held nearly five years ago it was voted to increase the capitalization by issues of additional stock, both common and preferred. The meeting further voted to turn over to Mr. Cigol 12,940 shares of common, $10 par value, as consideration for the assignment by him to the corporation of certain patents and applications for letters patent covering processes for the manufacture of rubber toys, etc.

The preferred stock was to be taken by another concern which held stock in the Cigol company and was a creditor in the amount of $49,000. The money was paid in for the preferred stock and the corporation was set on its feet again. At the end of June, 1919, Mr. Cigol resigned from the presidency and management of the company and it was then found that the letters patent, the applications having been granted, had never been assigned by Cigol to the corporation. A Chancery Court action was instituted in the name of the company and resulted in a decree directing Cigol to assign the patents in dispute.

The Red Raven Rubber Co., of Newark, New Jersey, has been authorized to issue, without par value, 1,750 shares of common stock to sell at $35 each, and 1,500 shares of Class B common to sell at $1 each. The company was recently incorporated by Joseph H. Dwork, Anshel Freedman and David Feingold.

The Manufacturers' Engineering Co. has leased for a term of years a part of the building at 247 Sherman avenue, Newark, New Jersey, for the manufacture of a new style tire pump and a gasoline recording machine.

Judge Lynch, of the United States District Court, has granted the appointment of Francis L. Kohlman, of New York, as receiver in equity of the Rambler Tire & Rubber Co., a Delaware corporation with offices in New York, and said to have assets in Garfield, New Jersey. The complainant, Emma Nurnberg, of New York, claims a debt of $3,500 for money loaned to the company. The petition gives the assets as $60,699.41 and the liabilities as $28,873.73. The petition also alleges that the company has no working capital, and cannot raise money to pay off its employes or its creditors, several of whom are said to have started suits.

The Atlantic City Tire & Rubber Corporation, Atlantic City, New Jersey, is erecting a plant at Mediterranean and Drexel avenues, for the manufacture of tires. The first unit will be a one-story brick structure 168 feet long by 90 feet wide, and is expected to be ready for the installation of the machinery the latter part of April. The proposed output for the first year is 300 tires and tubes a day. The temporary offices and a demonstration room have been opened at Massachusetts avenue and the Boardwalk.

The officers of the company are: A. Lincoln Pearce, president; R. M. Pearce, vice-president, and William C. Little, secretary.

THE RUBBER TRADE IN RHODE ISLAND

By Our Regular Correspondent

THE nearly 10,000 employes at the plants of the National India Rubber Co., at Bristol, and the Alice Mill of the Woonsocket Rubber Co., at Woonsocket, and the Millville Mill of the same concern at Millville—all of which are subsidiaries of the United States Rubber Co.—are anxiously awaiting some indication of improvement in business conditions which may bring about a complete resumption of operations at an early date. Announcement has been made that the shoe ("Keds") division at the plants will reopen on March 7. On February 9 announcement was made that the wire division, which had been shut down for several weeks, would resume operations on a limited schedule beginning February 14.

On the same day of the announcement of the resumption of the National plant at Bristol, notices were posted at the Alice Mill of the Woonsocket Rubber Co. that the plant would close February 19. The reason assigned for this suspension of operations is given by the management as the condition of orders. Employes to the number of nearly 1,100 are affected.

The American Wringer Co., the largest concern of its kind in the world, with a large manufacturing plant at Woonsocket, was placed in the hands of a temporary receiver on January 26 by a decree entered by Presiding Justice Willard B. Tanner of the Superior Court for Providence County, on petition of Sullivan Ballou, of Woonsocket, a stockholder and secretary of the corporation. Judge Tanner appointed the Industrial Trust Co., of Providence, of which Colonel Samuel P. Colt is chairman of the Board of directors, as temporary receiver to take charge of the effects of the company and to carry on the business. On February 2 the receivership was made permanent.

The petition for the appointment of a receiver alleged that the company was insolvent and unable to pay its debts and that a receiver was necessary to conserve the assets. Mr. Ballou, who filed the petition, stated that the action was taken for the purpose of protecting all the stockholders in a time of pressing obligations and of slow collections. He said that the proceedings would in no way affect the operation of the plant, which at normal time employs between 900 and 1,000 persons, and that the action was taken solely as a precautionary measure to avert difficulties which might be caused by pressing creditors.

Mr. Ballou also stated that the stock of the company, which is capitalized for $1,750,000, is largely owned in Rhode Island. Its 600 stockholders are mainly residents of Providence, Woonsocket and other Rhode Island towns with a few in adjoining communities in Massachusetts. The company closed its wringer department last November since which time it has been shut down, but the mechanical rubber roll department has been in operation and there are at the present time about 200 persons at work in that section of the plant.

The decree for the permanent receiver contains provision limiting the time for filing claims with the receiver to the period ending March 15. In addition to the usual powers of a receiver the court gives the Industrial Trust Co. authority to operate the plant, purchase supplies and materials, employ labor and to borrow money not to exceed $50,000. Notes may be given by the receiver from time to time, payable within sixty days and bearing interest at not more than 7 per cent. The holders of such receiver's notes are made preferred creditors under the provisions of the decree. The receiver is authorized to collect or compromise claims belonging to the corporation and to adjust or compromise claims against the company.

The American Wringer Co. was incorporated in 1889 and authorized to manufacture and deal in wringing machines. Its capital stock comprises 17,500 shares of $100 par value. Walter S. Ballou of Providence is president, J. F. Fletcher of New York is treasurer, while Sullivan Ballou of Woonsocket is secretary. The directors are: Walter S. Ballou, Robert J. Sullivan and Gilbert M. King of Providence, A. G. Beardsley, Jr., of Auburn, New York, J. F. Hemenway and John D. Aiken of New York City, and L. A. Milles of Middlefield, Connecticut.

At the Revere Rubber Co., Valley street, Providence, some of the departments are working on a shortened time schedule with a curtailed force. This is the situation principally in the tire section but in the departments producing medical supplies, household goods and other domestics they are not only operating full time schedules and forces but are running nights with many orders ahead.

To maintain the high standard of morale that has existed at the Revere plant, Franklin O. Kenyon, manager of the industrial relations department and a committee composed of workers from the various departments, has arranged a series of socials and dances to continue through the rest of the winter. The first of these was held in the cafeteria of the plant early in the past month and proved very successful. More than 200 factory and office workers were in attendance.

THE RUBBER TRADE IN MASSACHUSETTS

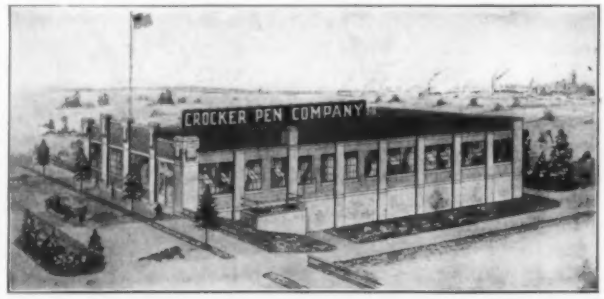
By Our Regular Correspondent

ONE man's meat is another man's poison, and so, the continuance of an exceptionally open winter, which minimizes the demand for rubber footwear, is increasing the consumption of tires considerably. Tire dealers report that business is beginning to pick up. Consumption has exceeded production for several months past and the surplus of last September seems likely to be almost exhausted before the heavy buying days of the spring. The B. F. Goodrich Co. anticipates an actual shortage.

Owing to the unprecedented war demands and the extreme weather conditions of last year the footwear capacity of the industry has been absorbed in 1920 without undue accumulations of stock. A few light snows during the past month have materially increased footwear sales, but the movement of retail stocks has been greatly retarded during the past two months and the volume of business still continues below normal. All indications now point to a big canvas shoe season, and manufacturers are particularly anticipating an increased vogue for white sport oxfords on the part of both men and women. Factories are still operating on part time schedules, however.

MISCELLANEOUS MASSACHUSETTS NOTES

The Crocker Pen Co., Boston, has moved its general offices and factory to a newly erected building located on the Revere Beach



NEW PLANT OF THE CROCKER PEN CO., EVERETT, NEAR BOSTON, MASSACHUSETTS

Parkway in Everett, just north of Boston. This is the first factory to be built in this part of New England for the exclusive produc-

tion of fountain pens. The company has expanded rapidly in its seven years of existence from desk room and a 1914 production of 10,000 pens to its present modern building with a capacity of 1,000,000 pens. The new structure is designed to carry two additional stories, which it is believed will be needed within a short time.

S. Jane Williams, of the Hood Rubber Co. forces, Watertown, is first vice-president of the New England Industrial Nurses' Association, an organization of 215 factory nurses with headquarters at 3 Joy street, Boston, where monthly meetings are held to keep members in touch with health work progress in other plants. The association was organized in 1915.

The American Tire Fabric Co., Newburyport, employing about 300 hands, shut down its mills for two weeks or more at the end of the first week in February.

The Panther Rubber Co., Stoughton, Massachusetts, announces the appointment of Dudley Freeman as general sales manager of its combined plants, which include besides the Stoughton branch, the Panther Rubber Co., Limited, Sherbrooke, Quebec, Canada, the Panco Rubber Co., Chelsea, Massachusetts, and the Puritan Rubber Manufacturing Co., Trenton, New Jersey. Mr. Freeman has been sales manager for the Canadian branch and has been very successful. He is a native of New York City and has made a specialty of marketing. He will make his home in Boston. The Panther Rubber Co., manufactures the Panther tread and several other brands of rubber heels, besides soles, soling mats, mechanical molded rubber goods, etc.

The Cambridge Rubber Co., Cambridge, Massachusetts, is now manufacturing a general line of rubber footwear in its recently completed footwear factory. For several years the company has been making a line of high-grade tennis shoes in addition to its canvas and rubber outing shoes, rubber clothing, fabrics, molded goods and rubber heels for manufacturers. E. W. Dunbar, formerly superintendent of the Apsley Rubber Co., Hudson, Massachusetts, and a specialist in footwear production, is now factory manager of the Cambridge Rubber Co. Mr. Dunbar's long experience has made him favorably known in the industry. The name "Cameo" identifies the Cambridge Rubber Co.'s products and is a synonym for quality among distributers of rubber merchandise everywhere.

Warren MacPherson, president of the Cambridge Rubber Co., Cambridge, Massachusetts, is on his way to the Northwest and the Pacific Coast, where he will call on the company's distributers.

F. H. Ayers, for the past four years sales manager for The Fisk Rubber Co., Chicopee Falls, Massachusetts, has been promoted to director of sales; William Wield, former assistant sales manager, has been advanced to sales manager. Other appointments include K. S. Chamberlain as manager of export sales and C. H. Gage and L. N. Southmayd as assistant sales managers.

PHENOMENAL GROWTH OF THE MEADE RUBBER CO.

The Meade Rubber Co. has recently completed a large three-story addition to its plant at Stoughton, Massachusetts, which increases its floor space from 26,000 square feet to 54,000 square feet, more than doubling capacity. The new factory addition is equipped with the latest type of machinery and has been running virtually full time through the present lull in business, manufacturing rubber heels, proofing, hospital sheeting, and rubber specialties for the shoe trade.

JAMES MEADE

James Meade, president of The Meade Rubber Co., is well known as a proofing expert and inventor of machines and processes peculiar to adhesive fabrics, including a multiple spreading and doubling apparatus, a process of making double texture fabrics, and a method of preparing and applying adhesive coats without solvents. Mr. Meade was formerly superintendent and vice-president of the Plymouth Rubber Co., but after that company's plant was removed to Canton, Massachusetts, he returned to Stoughton. In July, 1916, he established The Meade Rubber Co., which has been very successful and of phenomenal growth. For many months the company was working day and night to keep abreast of orders, which congestion resulted in the erection of the addition to its plant.

The Boston office of The Meade Rubber Co., located at 111 Lincoln street, is under the managership of Charles C. Dailey, for over ten years manager of the fabric department of the Seamans & Cobb Co., Boston. The New York office is located at 45 East 17th street, and is in charge of E. J. Hooper, formerly manager of the New York office of the Plymouth Rubber Co.

PLANT OF THE MEADE RUBBER CO., STOUGHTON, MASSACHUSETTS

THE RUBBER TRADE IN OHIO

By Our Regular Correspondent

AKRON NOTES

THE outstanding development in the rubber industry in Akron for the past month, or even the past year, is the completion of the refinancing of the Goodyear Tire & Rubber Co. and of plans to increase production at the plant to 18,000 tires a day.

Although many factors combine to add a better tone to the industry, the probability that the Goodyear company will soon be in a position to reshape its affairs for the best possible business not only caused the business men and bankers in the city to be enormously elated, but gave added confidence to the rubber industry in general.

The feeling prevailed that with eastern bankers ready to shoulder the troubles of the Goodyear company temporarily, the outlook for the rubber industry as a permanent proposition was given the approval of the best financial men in the country, and also showed that these men look upon Akron as the real heart of the rubber industry in the United States.

Although the revival of Akron may not be brought about as speedily as is hoped, yet the prospect that the Goodyear company will soon be standing with both feet on the ground, ready to go into the market to sell its output with all the energy which has always characterized the operations of the company, is regarded as the opening wedge for better business and it may be taken for granted that no opportunities to increase business will be overlooked by Akron factories.

Other signs of better business, if taken separately, do not look enormous but when added together indicate that the corner has been definitely turned and the uphill trail has been entered. Orders at every one of the larger rubber companies have increased from 10 to 60 per cent during the past month over the December business. Practically every rubber company has taken back some of its former employes, the lowest number taken back being 100 and the highest thus far reported is 2,000.

Indications are that the Goodyear Tire & Rubber Co. must go to 18,000 tires a day in the very near future if money is available for the increased payroll. Goodrich has gone to one ten-hour shift, Miller has gone to nine and one-half hours and indications are that Firestone will soon go to ten hours.

Besides the greatly increased number of orders from the dealers, automobile manufacturers, encouraged by the business done at the New York automobile show, have gotten in touch with the larger rubber companies and are talking contracts. Reports from all over the country show that the dealers' shelves and storerooms are bare, and the first buying in the Spring will find them short. Already several of the companies have been compelled to refuse orders for odd sizes because they were not in stock. The stocks in the factory warehouses have been worked off and orders in the future must be filled by the production departments.

This actual and anticipated increase in orders finds the rubber companies in an admirable position to take full advantage of the increased prosperity. Changes in operation, increased efficiency and decreases in overhead will not be lacking in the new scheme of things. It may be stated that when business is back at the new normal the working day in Akron will probably be ten hours, with the third shift a thing of the past. The third shift has been expensive because of the low efficiency of the average workman, but during the past it was a necessity.

The companies have written off large sums for inventory with large amounts of raw material on hand and if the crude rubber market and the fabric market take a turn upwards this year the earnings of the Akron companies will show up well as compared with the depreciated earnings of last year.

The failure on the part of two rubber companies during January is not looked upon as being significant because of the causes which led to their failure. Evidence produced in court tends to indicate that the Interlocking Cord Tire Co., of Mogadore, failed because of mismanagement. Four of the Interlocking officials have been indicted by the grand jury for violation of the Ohio "blue sky" law, but the creditors have joined the stockholders in plans looking towards the working out of the difficulties of the company and putting it back on its feet.

The Lanahan Rubber Co., Akron, a small concern, was obliged to go into receivership because of the lack of working capital.

The Oldfield Tire Co., formerly at Cleveland, Ohio, has removed to Akron. Dick Jemison has been appointed advertising and sales promotion manager and will direct an extensive advertising campaign in national publications, trade papers, farm journals, and newspapers and direct by mail in the near future. Mr. Jemison was for the last year in charge of sales promotion for The Miller Rubber Co., Akron. Barney Oldfield is president of the Oldfield Company.

L. Grant Hamilton, well known in automotive selling and advertising circles, has recently joined the staff of The Akron Advertising Agency Co., Akron, Ohio.

A handball game between Jacob Pfeiffer, vice-president of the Miller Rubber Co., and one of the employes featured the opening of a new gymnasium at the Miller plant. One large room in the factory has been fitted up as a gymnasium through the voluntary efforts of 150 operatives.

W. O'Neil of the General Tire & Rubber Co., has been elected president of the Ohio Savings & Trust Co. to succeed F. A. Seiberling, whose duties have become too heavy to continue as chief officer.

S. B. DeRachi, export manager of The Miller Rubber Co., has resigned to take a similar position with the Quaker City Rubber Co.

Closer cooperation between Akron rubber manufacturers and the foreign trade department of the government is forecast by the appointment of W. W. Hall, traffic commissioner of the Chamber of Commerce as Akron representative of the Foreign and Domestic Trade Bureau of the Department of Commerce.

William J. O'Neil, founder and president of the O'Neil Tire & Rubber Co., formerly with The B. F. Goodrich Co., died suddenly of apoplexy on February 10, while on the way to his office. He was one of the pioneers in the rubber industry in Akron.

AKRON'S 1920 BUSINESS

Fourteen Akron rubber companies during the year 1920 did a combined business of $544,729,000, according to figures compiled by the Akron Chamber of Commerce. The total capitalization of these companies is $309,037,922 and the total payroll amounted to more than $126,000,000.

This was the banner year against which much of the future business of the industry will be measured. The total business would have been nearly 50 per cent more than that of the previous year but for the curtailments in credits which seriously affected the industry the last half of the year. However, the increase in sales over 1919 was considerable. The following figures showing the capitalization, sales and payroll of practically the same industries for the past six years is an indication of the rapidity with which the rubber industry has developed:

	Capitalization	Value Products	Payroll
1914	$118,493,800	$93,980,000	.....
1915	117,336,900	121,085,000	$19,154,887
1916	157,820,500	188,740,000	32,568,465
1917	165,871,986	279,883,054	56,860,640
1918	221,908,418	332,085,090	60,591,838
1919	227,119,275	427,796,317	101,178,591

Of the 1920 total, $504,872,639 was done by the Goodrich, Goodyear, Firestone and Miller companies.

During the past year the Firestone Tire & Rubber Co. led all other Akron companies in sales growth, jumping from $91,000,-

000 to almost $115,000,000, an increase of almost $24,000,000, or 26 per cent.

The Miller Rubber Co. sales show an increase of 21 per cent, advancing from $28,000,000 to more than $32,000,000 during the year.

The Goodyear Tire & Rubber Co. sales jumped from $169,000,000 in 1919 to approximately $205,000,000 in 1920, being an increase of 20½ per cent, while The B. F. Goodrich Co. sales increased approximately $8,600,000, or 6 per cent during the year.

Firestone profits dwindled to $1,245,163 as compared with 1919 profits of $9,306,978 while Goodyear, instead of showing a profit of $23,272,245 as in 1919, faced a deficit of not less than $34,000,000. Goodrich with a smaller increase in sales than the other companies, will show a larger net profit, which is estimated at not more than $3,000,000 as compared with profits in 1919 amounting to $17,304,813. Miller profits will probably be well sheared down by the writing off of inventories.

CLEVELAND NOTES

A. E. Christensen has joined the organization of The Cleveland Rubber Mold Foundry & Machine Co., Cleveland, Ohio, and will have charge of production of the mold and core and rubber machinery departments. Mr. Christensen has held similar positions with the Bridgewater Machine Co., the Vulcan Welding & Machine Co., and The B. F. Goodrich Co., all of Akron, Ohio.

John P. Haney, for some time eastern district manager of United States Tire Co., with headquarters in Boston, has been promoted to branch manager at Cleveland, Ohio. Mr. Haney came to Boston as office manager some ten years ago, having formerly been identified with the Morgan & Wright interests.

The H. H. Robertson Co., Pittsburgh, Pennsylvania, has appointed Benton Hopkins manager of its Cleveland office in the Kirby Building. This office is operated as a part of the Pittsburgh district office in charge of William R. Frazier, district manager.

MISCELLANEOUS OHIO NOTES

The Allsteel Ridewell Tire & Rubber Co., Dayton, Ohio, was recently incorporated with a capitalization of $250,000 to manufacture the Huetter metallic steam bag for curing tires, described elsewhere in this issue. The officers and directors include Andrew Huetter, a former industrial engineer with The B. F. Goodrich Co. and the Firestone Tire & Rubber Co., Richard P. Burkhardt, George F. Kramer, A. J. Pocock, and Henry Knapp. The company has adopted the name "Artyr" to serve as a trade mark and a short company name as well. A new plant will be erected in Artyr Park, a suburb of Dayton, and work will shortly be started on ideal homes for employes as well as the new factory.

The general offices of The Columbia Tire & Rubber Co., maker of automobile and motorcycle tires and tubes and tire accessories, have been removed from Columbiana, Ohio, to 270 West Sixth street, Mansfield, Ohio.

The Ohio State Rubber Tire Co., Port Clinton, Ohio, has elected the following officers: president, Anthony Schroeder; vice-president, J. F. Langenau; treasurer, G. J. Daum; secretary, C. E. Gerner. The board of directors includes also F. P. Reichert and W. S. Lee.

The Electric Rubber Reclaiming Co., of Barberton, has been compelled to ask creditors to accept paper at 7 per cent because of the crude rubber market which made the reclaiming of rubber unprofitable. The company is now reorganizing for the manufacture of specialties. The reclaiming department is to be completely abandoned.

The Marathon Rubber Co., Cuyahoga Falls, reelected last year's officers for the ensuing year. W. H. Jenks remains president.

H. M. Cook has been appointed manager of the Columbus, Ohio, branch of the I. J. Cooper Rubber Co., Cincinnati, distributers of tires, accessories, batteries, vulcanizing equipment, etc.

THE RUBBER TRADE IN THE MID-WEST

MID-WEST RUBBER MANUFACTURERS' ASSOCIATION

THE regular monthly luncheon and meeting of the Mid-West Rubber Manufacturers' Association was held at the Chicago Athletic Association, February 15. A large number of the members were in attendance, and after the luncheon interesting remarks and suggestions were made by the following members:

Charles F. H. Johnson, Brighton Mills, Passaic, New Jersey, spoke on guaranteed mileage of tires. Thomas F. Whitehead, president of the National Tire Dealers' Association, Chicago, Illinois, made a suggestion that manufacturers should make and sell to dealers only standard make of tires, and junk the seconds, in order to prevent the "gyp" tire dealer from putting such defective tires on the market. S. P. Woodard, president of the Gillette Rubber Co., Eau Claire, Wisconsin, submitted a report of the meeting of the Committee on Cooperation, which was held previous to the regular meeting.

The above remarks and suggestions were listened to with great interest and appeared to meet the hearty approval of all present. A note of optimism was evident in what nearly all of the speakers said, the apparent feeling being that business in the tire industry was on a firmer basis and that demand was increasing among the dealers. It is believed by all those present that there will be a shortage of tires by mid-summer.

H. S. Vorhis has resigned as secretary and general manager, and C. S. Sutherland is acting general manager of the association.

MISCELLANEOUS MID-WESTERN NOTES

The Iowa branch of the Hood Rubber Products Co., Inc., has been moved from Davenport to 206-210 West Eleventh street, Des Moines, Iowa. A. J. Wylie, who has been manager of the Davenport branch will move to Des Moines and continue in charge.

The Rub-Tex Products, Inc., Indianapolis, Indiana, at its annual meeting of stockholders, January 10, 1921, elected the following officers: Edwin H. Emrick, president; L. E. Klug, vice-president in charge of production; George E. Goble, 2d vice-president; Everett L. Deupree, treasurer; Scott C. Legge, secretary and assistant treasurer. These officers also constitute the board of directors. The company specializes in mechanical and molded rubber goods. It was organized early in 1920, and purchased the machinery and equipment of the Everwear Rubber Company of Milwaukee, which it moved to Indianapolis in September, 1920.

L. A. Brown, formerly district manager for the United States Rubber Co., has been elected president of the Grand Rapids Tire & Rubber Corporation, of Grand Rapids, Michigan. Mr. Brown is well known among tire dealers and distributers, who will be interested to hear of his appointment. The plant of the Grand Rapids Tire & Rubber Corporation will be under production by April 1, 1921, and has a capacity of 1,000 tires and 5,000 heavy gray tubes a day. The company will manufacture cord tires exclusively, which it will market under the trade name "Corduroy Cord."

The receiver appointed by the Allen County Circuit Court, Fort Wayne, Indiana, for the Fort Wayne Tire & Rubber Manufacturing Co. has been removed by the United States Court, sitting in Indianapolis, on the ground that the appointment of the receiver was improvidently made, and the property was returned to the company. J. C. Brown and L. E. Kraft, former officers and directors of the company, have resigned, and Albert E. Thomas and C. M. Billings have been appointed to the board of directors. Plans have been formulated for financing the company through the stockholders, and the campaign is reported to be progressing very well. It is predicted that in a short time the company will be on a solid manufacturing basis.

E. B. McKay, formerly vice-president of the Empire Tire & Rubber Corporation, Trenton, New Jersey, has been elected vice-president and general manager of the Inland Rubber Co., 146 West Twenty-seventh street, Chicago, Illinois.

The Badger Raincoat Co., Port Washington, Wisconsin, reports business in a very good condition. Recently the company shipped a carload of raincoats.

C. W. Moon, formerly with the Detroit Steel Products Co., has been appointed manager of the Detroit branch of the H. H. Robertson Co., Pittsburgh, Pennsylvania.

The Miller Rubber Co., Akron, Ohio, has opened a direct factory tire branch at 2220 Farnum street, Omaha, Nebraska, with A. G. Wall as branch manager.

Hillis F. Hackedorn, formerly manager of the Detroit office of the H. H. Robertson Co., Pittsburgh, Pennsylvania, manufacturer of mineral rubber and hydrocarbons, has moved to Chicago, where he will have charge of that company's central district territory, including Indiana, Michigan, Wisconsin, Illinois, Missouri, Iowa, Minnesota, North and South Dakota, Nebraska, Kansas and parts of Ohio, Arkansas, Oklahoma and Ontario.

The Jeffery Manufacturing Co., Columbus, Ohio, has removed its Denver office from the First National Bank Building to 421 United States National Bank Building, Denver, Colorado.

The KeHawKe Manufacturing Co., 1006 West Lake street, Minneapolis, Minnesota, maker of the KeHawKe revolving tire spreader, is officered by J. Earle Kemp, president; D. W. Kemp, vice-president; P. E. Hawkinson, secretary.

The Burdick Tire & Rubber Co., 10 South La Salle street, Chicago, Illinois, is offering for sale to former stockholders a part of its preferred stock issue amounting to approximately $100,000. The company's new plant at Noblesville, Indiana, is expected to be ready for operation early in the spring and will manufacture Burdick "shingle" tires and automobile tubes. Officers of the company are H. G. Steinbrenner, president; F. E. Teachout, vice-president and general manager; H. P. Steinbrenner, secretary and treasurer.

The stockholders of W. H. Salisbury & Co., Chicago, Illinois, at their annual meeting February 8, reelected the following officers and directors to serve another year: M. B. Salisbury, president; H. H. Salisbury, vice-president; Richard H. Geier, secretary; L. H. Winne, J. C. Kettner, T. R. Claffy and George J. Holmes, directors. The company's new rubber mill in Chicago is now fully equipped and ready to take on increased volume of business in molded rubber goods, etc. The increase in the business done by the company in February was marked and would seem to indicate a revival of trade.

THE RUBBER TRADE ON THE PACIFIC COAST

By Our Regular Correspondent

As indicating what may be expected in tire replacements for 1921, it is stated that the automobile registrations in seven Pacific states show an increase for 1920 over 1919 of 26.6 per cent. The totals are: For 1919, 822,061; for 1920, 1,032,901.

Improving business conditions are reported by many of the leading rubber manufacturers and dealers on the Pacific slope. The United States Rubber Co. states that February business in its many lines has averaged well above that of the corresponding period in 1920 and the outlook, judging from orders and inquiries, is very encouraging for 1921.

Tire manufacturers and dealers have been preparing to contest a proposition made in the California state senate by Senator Walter Eden of Santa Ana for the imposition of a tax, graded according to size, on automobile tires to provide additional funds for the upkeep of the state highways.

LOS ANGELES NOTES

The E. M. Smith Co., 618 Clarence street, Los Angeles, has shipped to Colombia, South America, the first instalment of a carload of rubber and canvas belting to be used on oil-drilling machinery in the newly opened fields in the interior. The goods on reaching Cartagena will be transhipped by mule-back.

All departments are being operated well up to capacity at the West American Rubber Works, 400 Avenue 19, Los Angeles. The concern supplies considerable rubber goods for the oil fields of the Coast and Southwest, and also manufactures many patented specialties.

"A notable increase in orders," is the report made by Roy R. Meads, president and general manager of the Pacific Rubber Co., one of the largest tire distributers in Los Angeles, and which has several branches on the Pacific Coast.

A. F. Osterloh, vice-president and general manager of the Goodyear Tire & Rubber Company of California, has been appointed by Sylvester L. Weaver, president of the Los Angeles Chamber of Commerce, chairman of its Committee on Manufacturing. During his short residence in the California metropolis, Mr. Osterloh has taken an exceptionally active interest in the civic and commercial welfare of the city.

With the installation of delayed electric equipment, the new plant of the West Coast Asbestos Co. at Downey, a suburb of Los Angeles, was scheduled to start operations March 1. The concern, which will employ 100 men, reports large advance orders for asbestos brakes, clutch-blocks, facings, linings, and disks, belts, gaskets, and other asbestos textile goods. A large part of the orders is for export.

The Process Rubber Co., 5918 Hollywood Boulevard, Hollywood, Los Angeles, of which H. A. Schnelbach is manager, is a new concern which specializes in processing new and old tires with laboratory treatment of carcass and tread.

In a model adobe home at Larchmont avenue and Third street, Los Angeles, built and equipped at a cost of $85,000, one of the novelties is a kitchen floor covered with rubber tiling laid in continuous strips; also a sink drain board similarly covered. The tiling was made by the West American Rubber Works, of Los Angeles.

West Coast distributers of Brunswick tires report to the Pacific headquarters of the Brunswick-Balke-Collender Co. in Los Angeles that February sales are well abreast of those of last year, and that the outlook for 1921 business is very promising.

The Goodyear Tire & Rubber Co. of California has established a legal first aid department for its employes which is in charge of Walter I. Lyon, formerly deputy prosecuting attorney at Youngstown, Ohio.

J. A. Ankrom, of Los Angeles, who owns a large plantation adjacent to the Davao gulf in the Philippine Islands, and has been actively engaged in trade there for twenty-two years, is arranging with Los Angeles capitalists for extensive developments, largely in rubber growing, in the islands. Mr. Ankrom's plan contemplates a land grant from the Philippine Government similar to that obtained by the Southern Pacific Railway Co. and other such concerns in the United States, to alternate sections, and in which both Filipino and American capital would be employed.

The Climax Rubber Co., Columbus, Ohio, has had a representative, Frank B. Thompson, looking over the Southern California territory with a view to establishing a Pacific Coast factory branch, probably in Los Angeles.

The National Airless Tire Co., Los Angeles, has bought a site for a factory in Norwalk, Los Angeles County, and will soon begin building. The Norwalk stockholders recently held a meeting and dinner, the presiding officer being A. D. Bradbeer, of Norwalk. The speakers were: C. H. Braden, secretary and manager; Reverend Horace E. Partridge, F. R. Bryant, O. A. Lane, president; C. F. Evans, treasurer, and Mayor O. C. Jones, of Buckeye Lake, Ohio.

The C. H. Rapp Tire Co., one of the largest concerns in its line in Los Angeles, has left its old stand at Broadway and Tenth street and joined the fast-growing automobile and tire colony centering about Pico and Figueroa streets.

NORTHWESTERN NOTES

Seattle tire dealers, who are members of the Seattle Automotive Trade Division, have elected C. C. "Cy" Miller chairman of the division; C. W. Sexsmith of the Metropolitan Tire Co., secretary; and A. T. Mapson, of the Tyre Shop, as representative on the trades council.

Rubber men on the Pacific Coast are much interested in plans being made by Lieutenant Colonel C. A. Sloane, U. S. A., of the Washington-Alaska Cable System, for a new high-speed duplex cable from Seattle to Sitka, Alaska, a distance of 1,000 miles, and thence to Dutch Harbor, Aleutian Islands, 1,000 miles more. The distance from this point to Yokohama is another 2,000 miles, and if the long-talked-of cable line from Seattle to Japan were thus hooked up, quick communication could readily be provided with the rubber shipping ports of the Far East. It is explained by the government expert that a cable could not be extended across the Pacific without some such system of relays.

The B. F. Goodrich Rubber Co., carrying out its recently adopted policy of selling to the trade only, has closed its uptown branch at 1522 Twelfth avenue, Seattle, where it has been established twelve years. This branch has been used for wholesale and retail business, and will henceforth, or until it can secure larger headquarters, maintain a general warehouse at King and Occidental streets.

Henry E. Schmidt, one of the foremost automobile men in Seattle, has taken an agency at 1529 Eleventh avenue for Hewitt tires and tubes.

L. E. Carpenter has been appointed by the Goodyear Tire & Rubber Company of California as district manager at Portland, Oregon. George Bellis has been made division manager in charge of mechanical goods sales.

SOUTHWESTERN NOTES

The Spreckels "Savage" Tire Co., San Diego, California, has announced promotions including Wayne Compton, formerly manager of sales to corporations, to assistant sales manager; George W. Greene from assistant superintendent to superintendent; and Ralph E. Brown from chemist to assistant superintendent. Reports from the company state that business is now beginning to feel the influence of the spring demand and that the prospects are bright for a healthy and reasonably rapid return to normal.

STATEMENT OF THE GOODYEAR TIRE & RUBBER COMPANY OF CALIFORNIA

The balance sheet of the Goodyear Tire & Rubber Company of California for the fiscal year ended October 31, 1920, shows an earned surplus of $568,654 before Federal taxes and dividends. Of this amount $500,128 was allowed by the Akron company out of profits of the territory from July 12 to November 1, 1919. The company's statement shows a net profit before inventory adjustments of $703,525 on a total net business of $16,230,986, which was an increase of approximately $1,242,000 over the business of the previous year for the same territory. From the net profit a deduction of $635,000 is made for adjustment of inventories of raw materials and work in progress on a basis of rubber at 26 cents a pound and cotton at 60 cents a pound. Dividends paid during the year totaled $597,139, or $28,484 more than the earned surplus. The quarterly payment due January 1, 1921, was passed. Total assets and liabilities are $21,942,476.

THE AMES HOLDEN TIRE CO., LIMITED

The plant of the Ames Holden Tire Co., Limited, Kitchener, Ontario, Canada, is located in the heart of the business district of that city, having been built on the estate formerly owned by the late Crown Attorney. This property was one of the city's landmarks and its setting between well-kept lawns and luxuriant shrubs and trees affords a view not often enjoyed by industrial enterprises.

The factory building proper is two stories high, 90 feet wide by 400 feet long, with all footings, framing, etc., arranged for its expansion to six stories. It is a structural steel-frame building with red-facing brick exterior and has a floor space of 87,000 square feet.

The technical building, a one-story structure of construction similar to the factory building, with a floor area of 7,000 square feet, was built for the accommodation of the chemical and technical division where intensive research peculiar to tire manufacture takes place in a completely equipped laboratory. Quartered in this building as well is the engineering staff of the company, which is responsible for the factory construction, equipping and maintaining of the plant.

The power house at the south end of the factory is the last word in modern construction and efficient steam production. Hydro power is used as a prime mover throughout the factory.

The plant is well located with regard to railway facilities, the Grand Trunk Railway's main line abutting the property on the northeast, and the Canadian Pacific Railway paralleling the property on the south.

The ample grounds surrounding the plant will allow for considerable expansion. The present buildings when completed to six stories will have a capacity of 3,000 tires a day, and the property as laid out for future development will provide for at least 10,000 tires a day.

Ground was broken for the construction of the factory on July 16, 1919, and the first tire was manufactured on March 10, 1920, eight months and eighteen days from the inception of the work.

The company's product is sold by the Ames Holden McCready System, whose head offices are in Montreal, and which has branch sales warehouses all over Canada from Halifax to Vancouver. The executive and factory staffs of the Ames Holden companies are largely composed of men who were formerly the leading officials and department heads of the Canadian Consolidated Rubber Co., Limited, the Canadian organization of the United States Rubber Co.

PLANT OF AMES HOLDEN TIRE CO., LIMITED, KITCHENER, ONTARIO, CANADA

Activities of The Rubber Association of America

MEETINGS

EXECUTIVE COMMITTEE—TIRE MANUFACTURERS' DIVISION

A MEETING of the Executive Committee of the Tire Manufacturers' Division was held in New York City, February 16 when important matters of interest to tire manufacturers were considered. The principal subjects related to the support tendered by the association to various roads organizations, and the adoption of a standard schedule of loads, tire carrying capacities, etc., for recommendation to legislatures contemplating the enactment of motor vehicle legislation.

The question of further standardization in the sizes of automobile tires emphasized the need for a technical committee which would have as its primary purpose the consideration of all tire standardization matters. A step in the right direction was taken by the appointment of a committee of five members of the Executive Committee to comprise a Technical Committee of the Tire Manufacturers' Division of the Association through which all standardization projects are to be progressed.

The "returned goods" problem, which is probably one of the most important now confronting the tire manufacturers of the country, was also the subject of a very interesting discussion.

CYCLE TIRE MANUFACTURERS' COMMITTEE

A meeting of the Cycle Tire Manufacturers' Committee of the Tire Manufacturers' Division was also held February 16 at the association offices. The recommended standardization of bicycle tire sizes submitted by the Cycle Trades of America, and the suggestion that statistics of the bicycle and motorcycle tire manufacturing industry be obtained in a similar manner to the Tire Manufacturers' Division of the Association with respect to the inventory, production and shipments, etc., of automobile tires and tubes, served as the main topics of discussion.

EXECUTIVE COMMITTEE—MECHANICAL GOODS DIVISION

A meeting of the Executive Committee of the Mechanical Rubber Goods Manufacturers' Division was held February 15 in New York City. Steps were taken to institute a plan for gathering statistics regarding the mechanical rubber goods manufacturing industry with respect to the inventory, production and shipments of various classes of mechanical rubber goods. Consideration was also given to the suggestion that standard equipment be prepared for repairing conveyor belts and for splicing small endless belts in the field, and as a result a committee, in conjunction with the Specification Committee, was appointed to investigate the possibilities in that drection, and to report later to the Executive Committee.

Another sub-committee was appointed having as its purpose the standardization of pulleys used in connection with rubber belting in so far as their installation, sizes, diameters, etc., are concerned, and with the cooperation of pulley manufacturers very interesting and practical results are anticipated.

EXECUTIVE COMMITTEE—FOREIGN TRADE DIVISION

The Executive Committee of the Foreign Trade Division met with the general manager and P. L. Palmerton, the newly appointed manager of the Association's Foreign Trade Bureau at its offices on February 17. A discussion of the contemplated activities of the bureau consumed practically the entire session.

BOARD OF DIRECTORS

A joint meeting of the Board of Directors and Executive Committee was held at the Union League Club, New York City, February 25. The docket was given over entirely to the recommended expansion of the Association's organization and activities.

TRAFFIC COMMITTEE

The Traffic Committee will meet at the association offices on March 2 and 3.

AN IMPORTANT MATTER—QUESTIONNAIRE NO. 104

NEW YORK, February 1, 1921.

To rubber manufacturers and reclaimers:

There is enclosed, in duplicate, Questionnaire No. 104 calling for statistics concerning the operations of your company during the second six months of the year 1920, with respect to the consumption of crude rubber, sales value of finished products, average daily number of employes and the production of reclaimed rubber.

We shall be very grateful for your assistance in the gathering of these data, and wish to direct your attention to the fact that the questionnaire should be returned to the Guaranty Trust Company on or before February 15, 1921.

We wish to mention the fact that it will be very helpful in compiling the totals if you can possibly insert separately the data requested under the specific items shown in Section V of the Questionnaire instead of showing, perhaps, only one or two totals for the whole.

A. L. VILES, General Manager.

CHANGES IN CONSOLIDATED FREIGHT CLASSIFICATION NO. 2

NEW YORK, February 7, 1921.

To Firm Members:

The Consolidated Freight Classification Committee has published Consolidated Freight Classification No. 2 effective April 1, 1921. Copies of this publication that contain ratings, descriptions or packages, specifications for containers and other rules governing acceptance of freight for transportation can be secured from R. C. Fyfe, chairman, Consolidated Freight Classification Committee, Transportation Building, Chicago, Illinois, at annual subscription rate of $2 per copy. This publication contains a number of changes in ratings of interest to the members; the nature of these changes follows:

HOSE—COTTON, LINEN, LEATHER OR RUBBER, SEPARATE OR COMBINED, WITH OR WITHOUT WIRE REINFORCEMENT

The less than carload ratings on this commodity for application to and within western classification territory, when shipped in wrapped bales, bundles, or rolls or in crates, is reduced from first class to second class.

LEATHER—ARTIFICIAL OR IMITATION, INCLUDING COATED AUTO TOP MATERIAL

The ratings applicable in western classification territory are reduced on less than carload shipments when in bales, boxes or wrapped bundles from first to second class and when in carloads in the packages named, ratings are reduced from third class to fourth class.

PACKING

Ratings on less than carload shipments of asbestos packing compounded or reinforced, in bales, or burlapped rolls, or in barrels, or boxes, is reduced in western classification territory from first class to second class. Packing manufactured from rubber or gummed compound, in bales or burlapped rolls or in barrels, boxes or crates, less than carloads is reduced in western classification territory from first to second class and in carloads from third class to fourth class.

TIRES, RUBBER, PNEUMATIC

The most important change in the classification as affecting rubber manufactured products, is the granting of the application of the Traffic Committee of the Association for reduction in the carload ratings of pneumatic tires in carloads to and between points in western classification territory from second class to third class, with minimum carload weight of 20,000 pounds. The establishment of these reduced ratings on pneumatic tires places the ratings on the same basis throughout the United States.

Heretofore the classification provided that in order to secure first class rates on pneumatic tires in crates, in less than carloads, to and within western classification territory, it was necessary to line the crates with strawboard or pulpboard. This requirement has now been removed and on and after April 1, 1921, the first class rates will apply on tires shipped in unlined crates to and

within points in western classification territory, the same as applies in eastern and southern territory.

SOLID TIRES

Less than carload ratings on solid tires, in burlapped bales or burlapped bundles or burlapped reels, or on bundles enclosed in burlap-wrapped fibreboard or pulpboard containers or in boxes or crates, are increased from second class to first class in official classification territory, which is the territory applying east of the Mississippi and north of the Ohio and Potomac rivers.

A. L. VILES, General Manager.

MINNESOTA LEGISLATION REGARDING MARKING OF MERCHANDISE

NEW YORK, February 19, 1921.

To Rubber Manufacturers:

Our attention has been directed to a bill introduced in the Minnesota Legislature by representatives F. E. Miner (Minneapolis) and B. F. Keller (St. Paul) on February 8, to require the marking of merchandise with the manufacturer's cost, price at which sold by him, name and address of each distributor and the retail price of the article.

The impracticability and undesirability of such a condition as would be required by the proposed legislation is obvious, and it is suggested, in order to lend the influence of the rubber industry to the opposition which this bill will meet from other lines of business, that those of our members who are distributing merchandise in Minnesota arrange for the filing of a vigorous objection, by their representatives in that State, to the passage of the bill.

A. L. VILES, General Manager.

EXCISE TAXES REVISED

The Rubber Association of America, Inc., calls the attention of manufacturers of tires and tubes, rubber sundries, and mechanical rubber goods, in legislative bulletin No. 8, to some changes made in December, 1920, in the United States Treasury Department Regulations (47) concerning excise taxes on sales by manufacturers under Section 900 of the Revenue Act of 1918. These changes relate chiefly to sales for export which sales are free of taxes if the article be sold or leased for export and proof of such exportation be furnished by a manufacturer within six months from the time title passes or shipment is made. Articles Nos. 42 and 43 define in detail such tax exemption and describe the new certificates required where delivery of the article for export is to be made to the purchaser or his agent within the United States, as also certain changes in the "Proof of Exportation."

Copies of the revised regulations can be had from the United States Treasury Department, Washington, or from the nearest Federal revenue collector.

The Rubber Trade in Great Britain

By Our Regular Correspondent

THERE IS very little of a cheerful nature to discourse upon this month. Business generally remains in a moribund condition, a remark which applies with more force to many other industries than to rubber manufacture which, though depressed in some departments, continues to show decided activity in others. The sales of commodities of all kinds which were announced for January in order to reduce stocks and obtain much needed cash extended to almost all classes of rubber goods. Mackintoshes and rainproofs are offered at considerable reductions and I am informed by manufacturers that they are in most cases genuine bargains and not defective goods or goods made specially for sales as has sometimes been the practice in the past. It is doubtful, however, if the business done will be considered satisfactory because at a time when snow and frost are about, people are more attracted by the lowered prices of woolen goods, a woolen greatcoat ticketed at half the recently demanded price having a more potent influence upon the prospective purchaser than a mackintosh, however attractive the price.

WORKING HOURS REDUCED

Extended Christmas and New Year holidays have been the rule and even in the middle of January workrooms at factories where proofed cloth is made up into garments have remained closed, with no immediate prospect of reopening. Proofing works are not in such a bad condition and are running for three or four days a week, as a rule. Naturally, the recent wage cuts in America have attracted the attention of both employers and workpeople, though I have it authoritatively that there is immediate prospect of the example being followed in British rubber works. So far, the matter has not been considered but it is understood that reference will be made to the subject at the next meeting of the India Rubber Manufactureres' Association.

MANUFACTURERS CHEERFUL

In the prevailing trade depression the manufacturer is apt to pull a long face and to indulge in public in gloomy prognostications of impending ruin but probably this is largely a pose. One rubber manufacturer who was working a very short week struck me as being quite cheerful under his afflictions though he was, as he said, losing money. But he went on to say that we all did very well during the war and can stand a period of depression. Among the factors which had served to keep up his spirits was the fact of having bought nine months' supply of raw rubber at 8½*d.* a pound. This was probably not the highest quality but it was the quality he wanted and which he had never expected to get at the price. Naturally with raw rubber at its present level the scrap merchants and reclaimers are finding difficulty in keeping up their sales. Reclaimed rubber, however, has its devotees who will not lightly give up its use, even if new rubber is about the same price and there is the disinclination to alter standard mixings for proved products. As far as I can judge it is the proofers who have ceased their orders for reclaimed rubber rather than the mechanical goods manufacturers, it being recognized that the present is a good time to get a reputation for a sound rubber proof now that rubber is cheap. The momentary loss to the reclaimer is also expected in the business of the substitute manufacturer who perforce has had to make considerable cuts in his prices, somewhat overdue, I may add, seeing the fall in the oil market.

THE DUNLOP COMPANY

At the time of writing the eagerly awaited Dunlop company report has not appeared though it is due in a day or two. The market in the shares has shown fluctuations, the new issued at 30*s.* and 22*s.* 6*d.* paid, having touched 4*s.* During the slump, there have been few issues of new capital, one of these being 250,000 ordinary shares of £1 each offered at 24*s.* by W. T. Henley's Telegraph Works Co., Limited, which holds the whole of £200,000 capital of Henley's Tyre & Rubber Co., Limited. The business both in the cable and rubber works has shown a progressive increase and the new capital is required to finance the increased business and to provide for additions to the works.

RUBBER MACHINISTS

Messrs. Stevensons of Canal Foundry, Preston, are now among those who announce themselves as makers of rubber machinery to the trade. The name of the firm may not be as familiar to many in the trade as it is to me. For well over thirty years they have made certain classes of machinery for a large rubber works and it is understood that similar machinery was not to be made for competing firms. What the present arrangement is I do not know; the old embargo may have been removed or it may still exist with the liberty to make other classes of machinery for all and sundry.

The business of Summerscales, Limited, Phœnix Foundry, Keighley, as far as the rubber machinery section is concerned, has been taken over by The Cherry Tree Machine Co., Limited, Cherry Tree, Blackburn. It is the intention of this company to continue the manufacture of rubber machinery from Summerscales' patterns and to continue to use the same registered names.

NEW FACTORY ACT REGULATIONS FOR THE RUBBER TRADE

Rubber manufacturers have recently received a draft copy of the proposed new regulations relating to the use of the cold cure process which supersede the special rules for the vulcanizing of rubber first established in 1898. In the course of last year legislation was passed entitled "Women and Young Persons (Employment in Lead Processes) Act 1920," and it is now proposed to apply this act to the rubber trade where "lead processes" are in use. The two sets of regulations are issued on the same sheet of paper and no definition is given of what is to be considered a "lead process" in a rubber works beyond that it is the weighing, manipulation, or other treatment of "lead material" which is defined as being any compound of lead or any batch of materials containing any such compound. Presumably, then, the lead process means the handling of litharge, white lead, or red lead in the compound room and the mixing or calendering of a batch of rubber containing any of these. This means that no female or boy under sixteen can be employed in the mixing or spreading department of a rubber works if there is litharge in a batch of rubber and as women are still to be found in these departments it rather looks as if they will have to be dismissed or the use of litharge abandoned.

I am not saying that no precautions ought to be taken in the use of lead compounds, as I have long been of opinion that too much laxity has prevailed in rubber works in this matter. In the covering letter sent out with draft of the new regulation from the Home Office reference is made to the cases of lead poisoning which have occurred from the use of lead compounds in certain processes. It would have been more satisfactory if more definite language had been used. I have no personal knowledge of cases of lead poisoning among rubber workers, but if such are known to the Home Office it would be useful to have them cited and let us know in what particular process of the manufacture they were incurred.

NEW AND OLD REGULATIONS COMPARED

The old regulations for cold cure had reference only to bisulphide of carbon and chloride of sulphur while the new include also benzene, tetrachloride of carbon, trichlorethylene and any other carbon chlorine compound or mixtures containing them. These carbon chlorine compounds, though not widely used as yet in the rubber trade, are now known to be powerful anesthetics. Where any of the above are used the process is known as a "fume process" and no person shall be employed at it for more than five hours a day nor for more than 2½ hours at a time without a rest interval of at least one hour. The scheduling of benzene as a fume process is quite a new thing and not really of much importance, as under ordinary conditions its use is very small. It is satisfactory to note that there is no reference to solvent naphtha as there has been a good deal of talk in Factory Act officialdom about classing it with benzene. The new rules state that where benzene, whether pure or in the form of commercial benzol, is used in the process of spreading in the manufacture of water-proof cloth or in the preparation of the dough for such spreading a mechanical exhaust draught shall not be required if a standard of general ventilation of 30 changes of the air of the room per hour is maintained during working hours. Probably in fear of a prosecution for having only 29 changes of air the management of a works will abjure benzol for toluol or xylol and be free from care. Where a pressure system is used for the supply of fresh air to a room in which a "fume process" is carried on, the air supplied by such system must not enter the room at a velocity which exceeds 350 feet per minute.

With regard to boxing in the cold cure machines the regulations are much the same as before, while other rules relating to the provision of special mess rooms for workpeople eating on the premises will probably be complied with in the spirit by small firms by forbidding such workpeople to remain on the premises during meal hours. A month's grace has been given to the trade to enter protests against any of these new regulations.

BRITISH DUNLOP SECURES FINANCES

A cable report states that the Dunlop Rubber Co., Limited, has sought assistance from eastern bankers, through the British-Foreign and Colonial Corporation. The necessary credits have been arranged, pending a permanent form of financing. The crisis in the financial world has rendered the financing of the Dunlop American company impossible, so the English company has assumed the responsibility for it and the position of the English company has been safeguarded through the American company's assets.

FIFTH INTERNATIONAL RUBBER EXHIBITION

In connection with the Fifth International Rubber and Other Tropical Products Exhibition, to be held in London from June 3 to 17, 1921, the Rubber Growers' Association announces four competitions, as follows:

COMPETITION NO. 1

For the best commercial sample of plantation rubber taken from a consignment of not less than 50 cases, the consignment to contain the usual estate assortment of three grades as follows:

1. 75 per cent — No. 1 sheet and/or crêpe.
2. 25 per cent — Clean light brown crêpe from cup washings, lumps and anything not good enough for No. 1.
3. 25 per cent — Light or dark brown crêpe.

Samples are to be about 6 pounds of each grade wharf-drawn in London. Marks will be equally divided between the three grades, and condition and general packing will be considered in making the awards. A separate set of awards will be made for rubber produced in each of the five following countries: Malaya, Ceylon, Netherlands, Indies, South India including Burma, and Borneo. The awards for each of the countries named include:

First Award—Gold medal and cup or prize.

Second Award—Silver medal and £15 cash.

Third Award—Bronze medal and £10 cash.

Additional prizes will be awarded according to the number of entries. Medals and diplomas go to the estate owner, cups and cash prizes to the manager in charge at the time the consignment was made.

In the Malaya section C. E. S. Baxendale offers a special prize for the best sample of scrap rubber, to be awarded to the factory superintendent responsible for its preparation.

COMPETITION NO. 2

For the best commercial sample of plantation rubber produced in countries other than those included in competition No. 1 medals and/or diplomas will be awarded according to the number of entries.

COMPETITION NO. 3

For the best exhibit of rubber flooring prepared either in blocks, tiles, linoleum or such form in which rubber constitutes a large part in its manufacture. Medals and/or diplomas will be awarded according to the number of entries.

COMPETITION NO. 4

For the exhibit composed of the greatest variety of articles made from rubber for commercial purposes, medals and/or diplomas will be awarded according to the number of entries.

Competitions No. 1 and No. 2 are open to proprietors, managers and persons in charge of rubber plantations and entries close April 15, 1921. Competitions No. 3 and No. 4 are open only to exhibitors in the manufacturers' section and entries close May 16, 1921. All entries should be addressed to the Awards Committee, the Rubber Growers' Association, Inc., 38 Eastcheap, London, E. C. 3, England, and marked "Exhibition—Competition—No.—."

In competitions No. 1 and No. 2 all samples, marked for exhibition and bearing the competition number, are to be sent, accompanied by wharf-drawn certificates, to the committee room of the Rubber Trade Association of London, 6 Mincing Lane, London, E.C., with country of origin and name of competitor on the back of the label. All exhibits of rubber must be delivered to H. Greville Montgomery in the competition section of the exhibition, Royal Agricultural Hall, London, N., not later than May 23. Full conditions of the competitions are obtainable of the Rubber Growers' Association.

RUBBER GIFTS FUND

As in 1914, there will be a rubber gifts fund, the proceeds to be used for such purposes as may help public objects and also serve as good propaganda for the industry. In 1914, 50,000 pounds of rubber and numerous cash donations were utilized to present rubber flooring to three hospitals and one church. Similar donations are now solicited. Ceylon planters are being asked for 10 cents per planted acre, the Ceylon Government having promised a grant equivalent to the total private subscription up to 25,000 rupees. A similar course may be taken in Malaya, as in 1914.

The Rubber Trade in Europe

By a Special Correspondent

FRANCE

OUR French contemporary, *Le Caoutchouc et la Gutta-Percha*, publishes a letter from the Russian scientist, Professor Kondakow, well known among other things for his works in connection with synthetic rubber 20 years before the Germans did anything in this line. It appears that Russian scientists have suffered severely under the Bolshevist regime, the professor himself being obliged to seek refuge in Elva, Livonia. Their libraries, manuscripts and instruments have been destroyed or confiscated. In the letter mentioned above, Professor Kondakow appeals to publishers to send their journals and works to Russian scientists and scholars as was the custom before the war.

The rubber factory at Oullins, Rhône, belonging to M. Argaud, has been sold to M. A. Grammont.

A new factory for rubber, Etablissements Beldam-Latty, has been started at 27, 29, 31 rue Ernest, Puteaux, Seine. It is capitalized at 1,600,000 francs and will manufacture high pressure asbestos packing.

It is reported that M. Rollin, owner of the rubber factory of Steinbach, is rebuilding his factory that had been completely destroyed by the Germans. The new factory is to be larger and up to date.

The Société Indo-Chinoise de Culture et de Commerce is a new corporation formed for the purpose of trading, importing and exporting all kinds of merchandise in Indo-China, particularly rubber. The plantation and preparation of rubber and other products will also be taken up. Headquarters are at Marseilles. The capital has been fixed at 200,000 francs. The first administrators are René Bertin, owner, and Marcel de Gosselin, both of Paris; Albert Bonniel and Gabriel Renoux, both of Marseilles.

Botti, des Michel, Pindilli et Cie is the name of a new firm established at Marseilles to manufacture rubber goods. The capital amounts to 200,000 francs.

The Société Française Industrielle du Caoutchouc, Paris, capital 300,000 francs, has just been dissolved.

BELGIUM

The National Rubber Co. has been formed at Brussels. The object is to manufacture and deal in all kinds of rubber goods. The concern is capitalized at 2,250,000 francs.

Fire broke out in the Brussels factory of the Société Anonyme pour le Commerce et l'Industrie du Caoutchouc. Only the department for seamless nipples was damaged, the rest of the building being quite untouched by the fire. The employes were able to leave the building without panic and only one man who was in the department where the fire broke out was slightly injured.

At Brussels a company named Société Internationale Pirelli has been formed. It has a capital of 400,000 francs and its object is to deal in all kinds of stocks, shares, obligations, to acquire and exploit patents, licenses and concessions; to form and direct companies and syndicates; to make all issues of titles, shares, parts and obligations. Chief consideration will be given to the manufacture and sale of rubber, gutta percha and asbestos articles, electric conductors and accessories. The company can exercise its activities in Belgium and other countries.

Some time ago the Belgian Government had its Hevea planting experiment station at Yangambi, Belgian Congo, inspected by M. Smekens, who had spent ten years in Malaya planting rubber. According to M. Smekens' report the plantation at Yangambi was properly clean weeded. The soil is suitable for *Hevea brasiliensis* and the 7 to 8-year-old trees at Yangambi have the same dimensions as similar trees in Malaya. The trees are planted at a distance of 7 meters, so that thinning is not yet necessary. However, it was advised to keep track of the different kinds of producers for future reference, when thinning out should be necessary. Some changes in tapping and methods of preparation were also advised.

HOLLAND

A rubber planting company known as the Rubber Cultuur Maatschappij "Kawi," has recently been registered at Amsterdam, Holland. The founders are O. van Vloten, Cultuur Maatschappij Waringin, Société Financière de Caoutchouc. It is capitalized at 750,000 guilders ($300,000). The directors are J. Gerritzen, Batavia; J. Pernotte, O. de Rivaud, M. de Rivaud, all of Paris; E. H. Winkelman and S. W. Senerijn, both of Amsterdam.

SPAIN

M. Robert Klein, a well-known rubber manufacturer of Barcelona, is reported to be planning the establishment of a second model factory at Segoria, Spain. It will be thoroughly up-to-date and will also have a chemical laboratory as well as one for physical and mechanical tests.

ITALY

The firm of F. Mencarelli, Rappresentance e Commissioni Commerciali, Turin, Italy, has undertaken the representation of several German concerns of rubber and allied articles for Italy and the Colonies.

GERMANY

A review of the German rubber industry during 1920 shows that the demand for most articles was comparatively strong at the beginning of the year. This demand slackened toward the summer months but in some articles, particularly surgical goods, there was a marked recovery at the end of the year. The chief difficulties were the high cost of raw materials, expensive labor, strikes and the coal shortage. Efforts have been made to bring

the quality of goods up to pre-war perfection and with success, it is reported. Much harm was done by unscrupulous manufacturers who sold the public underpriced goods made of war substitutes. This was particularly noticeable in the belting trade. Reputable business men and manufacturers are anxious about the underselling that is rife and as a protection the asbestos and surgical goods branches have organized with a view to fixing minimum prices and qualities. The general opinion is that the trade must for the present be content with small profits, while maintaining qualities as far as possible. It is of interest to note that many large firms are again sending out representatives to foreign countries in spite of the great expense involved. There is, however, general disappointment over the attitude, not only of erstwhile enemies, but also of some neutrals. Among the latter Sweden seems particularly determined to keep out German rubber manufactures so long as the low rate of the mark continues.

In spite of all difficulties, Germans are determined to recapture their former trade and are working energetically to this end. The *Gummi-Zeitung* says in an article on the importance of the export trade for Germany, "If we take pains to make good deliveries, give people their money's worth and satisfy our customers as we did before the war, then we will find that 'Made in Germany' will not be a hindrance, that rather 'Guaranteed German Make' will follow."

The German Reichstag has accepted trade agreements with Hungary, Czechoslovakia and Austria. The agreements made before the war will be annulled and replaced by reciprocal most-favored-nation covenants.

The local convention regarding tires has been prolonged to September 30, 1921. In October last it had been prolonged to February, 1921. After February, however, individual factories will no longer be bound by fixed prices. The obligation, from then on, will cover only conditions of sales and guaranties.

FOREIGN TARIFFS

SWEDEN

Among the articles of export from Sweden still subject to license are: Rubber, gutta percha and balata, not manufactured, also reclaimed rubber; rubber thread for the manufacture of elastic fabrics, ribbon and cord; rubber tires, solid, even if in lengths; inner tubes and outer covers and parts thereof of rubber, even in combination with other materials, for cycles, motor cycles, and motor cars; rubber boots and shoes; rubber waste and scrap.

GERMANY

According to the *Board of Trade Journal*, London, December 30, 1920, india rubber, gutta percha and balata, raw or purified, and waste, also waste wares of such materials, may be imported into Germany without license.

POLAND

The following articles may be imported into Poland without import permits, as announced in the Polish *Journal of Laws*, September 13, 1920: rubber, gutta percha and balata, crude, india rubber waste; india rubber, prepared soft and hard (ebonite); tissues impregnated with india rubber for card fillets; elastic ribbons and tapes, containing india rubber threads, for garters, braces, etc.; manufactures and half-finished articles of soft india rubber, except boots, webs not specially mentioned, clothing, braces, garters, balls and toys.

HOLLAND

A Ministerial Decision, dated November 29, 1920, permits free importation into the Netherlands of rubber yarns, consisting of very thin quadrilateral rubber strips used for the manufacture of elastic ribbons.

BRITISH HONDURAS

According to the Customs and Excise Duties Ordinance No. 33 of 1920, dated October 12, 1920, imports into British Honduras of india rubber and gutta percha manufactures are subject to 15 per cent tax *ad valorem;* if the goods are of British manufacture, they are admitted under the "British Preferential Tariff" of 10 per cent *ad valorem,* but goods must show such proof of origin as may be prescribed by the Governor-in-Council from time to time.

THE RUBBER TRADE IN THE FAR EAST

By A Special Correspondent

MALAYA

SOME MONTHS AGO it was suggested in certain quarters that the local government should buy up rubber at a certain fixed price in order to save the rubber industry. For a while after nothing was heard of this, but lately people are talking about it again and appear to think that because the Federated Malay States Government has decided to buy tin at a fixed price, it will do the same for rubber.

As the *Malayan Tin & Rubber Journal* rightly points out, a policy that might be successful with regard to tin, would certainly prove a failure in the case of rubber. Rubber cannot be stored indefinitely without deteriorating and the Government would before long have to sell it to avoid heavy loss. The result of this release of large quantities of rubber would be that prices, which in the meantime may have risen, would experience a heavy drop and conditions would be the same as they are now, if not worse.

It has been suggested that a loan to planters would be of more real help and the question is raised, why a committee such as has been formed in Ceylon to represent before the Government the interests of planters, could not be appointed in Malaya to act in a similar capacity.

It is reported that the General Committee of the Singapore Rubber Association is considering a scheme for the establishment of a central godown, to which all rubber that the sellers desire to have awarded will be sent. Samples will be taken by an official and for those worthy of award, a kind of certificate will be given stating the nature of the rubber, the quantity, etc. This certificate will be sold as representing the rubber, payment to be made within a few days of the sale. This certificate can be resold until it reaches the party who wishes to ship the rubber, payment in each case being made within a given time. It seems there will be a limit to the number of buyers of a certificate, probably six. It is felt that such a measure, if actually carried out, would be very useful: first, insuring the last buyer against inferior goods; second, enabling an estate to receive payment quickly; third, cutting out much undesirable speculation.

A certain Dr. Braddon has written a long letter to a local paper in which he unfolds an ingenious scheme for bringing back the good old days of 100 and 200 per cent dividends. His plan is that producers, dealers, and brokers would form a combine with a capital of £30,000,000. This combine would buy up rubber at an agreed on all-in cost of 1*s.* 6*d.* per pound which would then be sold to buyers at 4*s.* 6*d.* per pound. The 3*s.* thus gained over an already exaggerated cost would be equally divided among producers and shareholders. The Government would aid by refusing to alienate further land for rubber and would get the governments of other rubber producing countries to do likewise. Of all the schemes hatched out in these feverish times, this one is certainly best calculated to meet the unanimous approval of the rubber producer and shareholder.

THE NETHERLANDS EAST INDIES

In spite of protests it seems that the new taxes will go through. Export duties on most products are to be levied for a period of three years. In the case of rubber the taxes will be on a sliding scale and levied as follows, on an average market price of:

Gilders 0.82½—0.90	tax ¼%	Gilders 1.10—1.20	tax 3%
Gilders 0.90 —1.00	tax 1%	Over 1.20	tax 4%
Gilders 1.00 —1.10	tax 2%		

So-called slab rubber will be subject to a reduction of 12 per cent.

A more comprehensive extension of the income tax than that already proposed will come into operation.

The tax on the net profits of corporations will be raised from 4 to 6 per cent. An excess profits tax of 6 per cent will be levied on that part of the income that is higher than 10 per cent of the paid up capital.

The Batavia freight conference has fixed the rate for rubber at 60 gilders per cubic meter.

Official reports show that the western division of Dutch Borneo, during the first half of 1920, exported 83,430 kilos of plantation rubber and 1,149,393 kilos of wild rubber. The exports of gutta percha, gutta jelutong and gutta hangkang were respectively 21,445 kilos, 371,216 kilos and 350,156 kilos.

The prices obtained during this period were subject to a good deal of fluctuation. Thus the highest price for gutta merah I, in January was 450 gilders per picul (133⅓ pounds), and the lowest 400 gilders; but in March, the figures were 600 and 250 gilders. Gutta merah II brought 200-150 gilders in January. Gutta jelutong reached as high as 18 gilders a picul in January and March but fell to 7.50 gilders in June. The highest price for rubber was obtained in March and stood at 135 gilders a picul. In January the range had been 130-100 gilders.

MALAYA CANNOT UNDERSTAND AMERICA'S POSITION[1]

It is almost impossible to make even the most enlightened Chinese and native rubber traders of the Malayan Peninsula understand America and the American conditions. They cannot visualize the United States as anything but a land where everyone is rich and prosperous and where financial conditions are always on the top wave. They do not understand, as we do, what is meant by inflation of credits—or deflation. They see no reason why there should be any need of deflation in a land like ours. They imagine the Yankee is depressing the rubber market for artificial reasons rather than for reasons based upon sound economics.

"Rubber is worth more than it is fetching in the market. That proposition cannot seriously be disputed. At a time when profiteering and hard economic facts combined have boosted the prices of most other things, Malaya's chief export is undergoing a period of severe depression," complains the *Straits Echo* of Penang, voicing the general sentiment of the Peninsula. "Many well managed estates are unable to pay reasonable dividends to their shareholders." Forgetting the fact that all industry is now suffering from severe depression from which the United States is by no means exempt, the impression prevails in Malaya that the world has treated it badly; that rubber growers have not learned the art of profiteering while others have, and are practicing it to the limit. Malayans do not wish to be invested with halos, however, and declare themselves willing enough to take big prices for their rubber if they can get them and they think they might, were they not so absorbed in growing it that they are blind to the obvious means of securing redress from their real or fancied grievances.

"However, the price of the commodity may drop," still further complains the *Echo*, "there is no lessening of the retail cost of rubber tires, water-bottles or tennis shoes. But the man who gets most of the consumer's money is not the producer, who is entitled to it if anyone is, but the manufacturer. He waxes wealthy whilst men toil and sweat beneath the tropical sun to provide him with the substance of his wealth. Your manufacturer is a wily bird, especially if he is an American. He collects a few other manufacturers and, after due cogitation, they form a combine of water-tight qualities. In various ways, some devious, others delightfully plain and unabashed, the combine decides what the price of rubber shall be. The producer lashes himself into a fury and cries out to Heaven for help."

The *Echo* is quoted quite extensively because that journal seems to voice the general feeling held in certain quarters thereabouts—a feeling that, because of its manifest unfairness, should be the business of every American to dispel in every possible way. Friction of this kind is not beneficial to good business relations.

[1]By Richard Hoadley Tingley, New York City.

THE WAY OUT

When there is a decline in the demand for manufactured goods amounting to a practical cessation of buying on the part of the public, it can hardly be expected that manufacturers will continue to buy the raw product from which their manufactured goods are made. This is a condition existing in America that the Malayan producer should see and recognize. It cannot be expected that the manufacturer will finance the producer by continuing to buy a raw product for which he has no immediate use, even if it is cheap—all the more so if his warehouses are crammed to capacity, not only with a surplus of the raw product, but with his own manufactured goods as well.

The manufacturer has his remedy, which, in part, will reduce his losses to a minimum. He can close down his mills, in whole or in part, and hope for better times, pocketing his "overhead" loss with as good grace as he can muster.

The only logical way in which the producer can get square with the game is to work for better prices and demand through curtailed production, just as the manufacturers do. A similar condition is seen with the cotton producers of the United States who are doing that very thing. Before now the planters of rubber of Malaya, the Netherlands, and Ceylon have been urged to cooperate for the protection of their mutual interests by systematic curtailment of production. Of those who cavalierly declare that the idea of the Rubber Growers' Association is impracticable, it can only be asked, "Has it ever been really tried? Is it not yet too early to condemn it?" With a common understanding and a common policy, a very strong position might be created. Sundry experts estimate that all will be well with rubber in three or four years' time—in fact, that there will be a shortage. But in the meantime it is, with the producer just the same, if he only knew it, as with the manufacturer—a case of the survival of the fittest.

FOREIGN TRADE FINANCING CORPORATION

Under the provisions of the Federal Reserve Act there has recently been organized the Foreign Trade Financing Corporation, backed by the business men, bankers, manufacturers and other producers of the country, to extend long term credits to foreign buyers of American goods and thus break the threatened paralysis of our international trade. Under the law it may also invest in securities, purchase bills of exchange, engage in foreign banking, and may further, with the approval of the Federal Reserve Board, issue and sell to the investing public its own notes and debentures to an aggregate amount of ten times its paid up capital and surplus. It may not engage in the general business of buying or selling goods or commodities in the United States, nor engage in domestic banking, except such as in the judgment of the Federal Reserve Board may be incidental to its international or foreign business.

The corporation is designed not only to offer a sound investment but also to render a much needed public service. It will seek to keep its loans and investments highly diversified among many countries and in a large variety of enterprises. The corporation will have a fully subscribed capital of $100,000,000 and a surplus of $5,000,000. Subscriptions to the stock are being received at the rate of $105 per share.

The presidency has been tendered to W. P. G. Harding, governor of the Federal Reserve Board. The board of directors of the corporation will consist of not less than thirty-six, nor more than sixty members, and will be representative of the sections of the country as represented by the twelve Federal Reserve Districts. The principal industries of the country, such as agriculture, manufacture and banking, will have places on the board.

Recent Patents Relating to Rubber

THE UNITED STATES

GRANTED JANUARY 4, 1921

NO. 1,364,104 Gas mask. W. C. Geer, Akron, O., assignor to The B. F. Goodrich Co., New York City.
1,364,141 Hose nozzle. L. H. Reams, Council Bluffs, Iowa.
1,364,219 Tractor tread with resilient tire for vehicle wheels. L. S. Szumkowski, assignor to Ursus Motor Co.—both of Chicago, Ill.
1,364,226 Shoe ventilator. J. A. Wherry, New Orleans, La.
1,364,250 Outsole of vulcanized fibrous composition. F. H. Clapp, Melrose, Mass.
1,364,275 Inflatable flotation device. V. Guinzburg, assignor to I. B. Kleinert Rubber Co.—both of New York City. (See description elsewhere in this issue.)
1,364,276 Dress Skirt Shield. S. C. Hannaford, Cincinnati, O.
1,364,300 Tire alarm. J. E. Parr, Crystal City, Manitoba, Can.
1,364,429 Abrading element for tire patch containers. J. E. Duffy, Dallas, Tex.
1,364,447 Blow out shoe for inner tubes. L. R. Moore, Dallas, Tex.
1,364,469 Storage battery container with hard rubber jar. J. L. Woodbridge, Philadelphia, Pa.
1,364,515 Demountable rim for tires. C. D. Paxson, Cleveland, O.
1,364,528 Supplemental waterproof and non-slippable tap-sole for shoes. M. Snider, Philadelphia, Pa.
1,364,576 Golf ball structure and method of manufacture. A. J. Musselman, Chicago, Ill.
1,364,583 Revoluble resilient heel-tread. H. W. Rogers, New York City, assignor to the Rogers Rubber Co., Westminster, Md.
1,364,596 Pneumatically reinforced casing for aeronautic carriers. N. B. Wales, assignor to Wales Pneumatic Parachute Corporation—both of New York City.
1,364,646 Air-bag and salvage method for raising sunken vessels and other objects. A. Ryan, Oldham, assignor to Vickers Iimited, Westminster, London—both in England.
1,364,691 Isolating listening apparatus with pneumatic cushions. Andre Bloch, Paris, France.
1,364,746 Garment supporter. E. F. Goodman, New York City.
1,364,758 Pneumatic and solid tire. F. Hickman, assignor of one-half to Bound Brook Oil-less Bearing Co.—both of Bound Brook, N. J.
1,364,790 Airless tire. F. E. Nelson, Chicago, Ill.
1,364,806 Typewriter eraser attachment. W. D. Reid, Brooklyn, N. Y.
1,364,818 Reinforced waterproof fabric for sanitary garments. G. B. Smith, Philadelphia, Pa.

GRANTED JANUARY 11, 1921

1,364,870 Cord tire. R. Ehle, Council Bluffs, Iowa.
1,364,888 Garter. G. Rottman, New York City.
1,364,928 Reinforcement for tire casings. W. S. Gauntt, St. Louis, and B. B. Morris, Kansas City—both in Mo.
1,364,930 Sectional pneumatic tire. R. W. Goodhart, Pensacola, Fla.
1,364,931 Pneumatic tire. R. W. Goodhart, Pensacola, Fla.
1,364,935 Collapsible rim for tires. E. A. Jones Los Angeles, Calif.
1,364,971 Elastic brush pad comprising two rubber sheets vulcanized into an integral body of flexible rubber, vulcanized to a greater degree on one side than on the other, and bristles embedded in and projecting from the more highly vulcanized side. M. W. Alexander, Albany, assignor by mesne assignments to Henry L. Hughes Co., Inc., New York—both in N. Y.
1,365,057 Vehicle wheel tire. W. H. Northall, assignor of one-fourth each to S. C. James and H. Males—all of Evansville, Ind.
1,365,076 Tire construction. O. H. P. S. Anderson, Los Angeles, Calif.
1,365,131 Fountain pen. H. J. Upton, West Medford, Mass.
1,365,151 Packing joint for tire valve. W. B. Burke, Cleveland, Ohio, assignor to A. Schrader's Son, Inc., Brooklyn, N. Y. (Original application divided.)
1,365,191 Fountain pen. R. E. Perkins, Joplin, Mo.
1,365,243 Tire for motor cars and other vehicles. W. Heggie, Dublin, Ireland.
1,365,280 Tire casing. Abraham Sacks, Brooklyn, N. Y.
1,365,313 Toilet cabinet for syringe bag and fittings. R. S. C. Fow, assignor to C. W. Schaffer, Jr.—both of Philadelphia, Pa.
1,365,350 Reinforced vehicle tire. T. Sloper, Devizes, England.
1,365,366 Calendar cap attachment for fountain pens. C. F. Ashby, Chicago, Ill.
1,365,375 Tire deflation indicator. E. O. Carvin, Alleghany, Calif.
1,365,391 Windshield cleaner. W. M. Folberth, Cleveland, O.
1,365,425 Soundproof shield for telephone receiver. W. A. Shewhart, Brooklyn, assignor to Western Electric Co., Inc., New York—both in N. Y.
1,365,452 Disk wheel for pneumatic tires. T. C. Burns and F. K. Huffman, assignors to Hayes Wheel Co.—all of Jackson, Mich.
1,365,459 Pneumatic blower device. P. Comina, Aptos, Calif.
1,365,460 Exercising apparatus. J. J. Cooper, Stamford, Conn.
1,365,463 Fountain pen with indicator. A. O. Dahlberg, Ann Arbor, Mich., assignor to W. Zeiss, Chicago, Ill.
1,365,539 Vehicle tire. J. W. Pepple, San Antonio, Tex., assignor of one-tenth to J. J. Rowe, Akron, O.
1,365,555 Demountable rim for tires. J. Sieven, Brooklyn, N. Y.
1,365,606 Pneumatic roll comprising a mandrel or core, an air tight flexible envelope, a filling of rubber sponge between the mandrel and envelop and vulcanized to both, an outer covering combined with the envelope and means for admitting a fluid into the interior space to form a resilient cushion. A. Seymour-Jones, Wrexham, Wales, assignor to The Turner Tanning Machinery Co., Peabody, Mass.
1,365,637 Vehicle wheel for solid tires. C. Macbeth, Birmingham, assignor to The Dunlop Rubber Co., Limited, Westminster, London—both in England.

GRANTED JANUARY 18, 1921

1,365,665 Pneumatic teat cup for milking machines. J. H. Davies, Melbourne, Victoria, Australia.
1,365,754 Toggle-joint self-filling fountain pen. John C. Wahl, Chicago, Ill., assignor, to The Wahl Co., Wilmington, Del.
1,365,767 Non-slipping sole pad. J. Contento, Albany, N. Y.
1,365,820 Tire valve. A. A. Dennis, Grand Rapids, Mich.
1,365,859 Dust cap for tire valves. H. L. Silver, Los Angeles, Cal.
1,365,862 Suspenders. W. H. Stevens, New York City. Original application divided.
1,365,879 Printing machine for nuts, having rubber ball printing device. A. S. Wysong, assignor to F. C. York, trustee—both of Los Angeles, Cal.
1,366,009 Shoe dauber with sponge rubber brush. W. E. Lane, Clinton, Iowa.
1,366,051 Cushion tire. H. L. Bethel, Millville, assignor of one-third each to J. B. Sharp and C. E. Woodruff, both of Bridgeton—all in New Jersey.
1,366,080 Puncture proof pneumatic tire. S. Kaufman, Boston, Mass.
1,366,121 Inflatable tourniquet. C. F. Dorsey. Iroquois Falls, Ontario, Canada.
1,366,177 Metal heel-protector containing rubber cushion. André Harribey and Edmond Combecave, Bordeaux, France.
1,366,190 Corset with elastic insert. D. Kops, New York City.
1,366,205 Teat cups for milking machine. O. A. Moldenhauer, Watertown, Wis.
1,366,223 Storage battery. R. W. Wales, Auburndale, assignor to A. Hartel, Jr., G. H. Burnett and O. R. Hartel, copartners doing business as Hartel Bros. & Co., Boston—both in Mass.
1,366,320 Sanitary flushing nozzle. M. S. Hufschmidt, San Francisco, Calif.
1,366,335 Rubber bloomers. K. Heitler, New York City.

GRANTED JANUARY 25, 1921

1,366,358 Blow-out patch for pneumatic tires. A. M. Clark, Knoxville borough, Pa.
1,366,388 Cushioned button for garment supporters. H. A. Keller, assignor to Kabo Corset Co.—both of Chicago, Ill.
1,366,392 Respirator. A. B. Lamb, Washington, D. C., and P. W. Carleton, Wilmington, Del.
1,366,437 Gas mask. O. F. Wagenhorst, Akron, O.
1,366,469 Tire gage. H. P. Kraft, Ridgewood, N. J.
1,366,493 Automobile horn. J. E. Reynolds, assignor to Clayton-Wright, Limited—both of Birmingham, England.
1,366,501 Tire valve. M. C. Schweinert, West Hoboken, and H. P. Kraft, Ridgewood—both in N. J.
1,366,518 Detachable rubber heel. A. G. Buchman, Kenosha, Wis.
1,366,540 Cushion wheel. F. O. Meyers, assignor to Pacific Automotive Co.—both of Los Angeles, Cal.
1,366,644 Suction device for artificial dentures and manufacture of same. A. W. Fisher, London, England.
1,366,708 Garter. E. Sprague, Jr., Oak Park, Ill.
1,366,727 Nipple and plug attachment for nursing bottles. A. Gerstner, New York City.
1,366,734 Portable shower-bath fixture. G. J. Koehler, Dayton, O.
1,366,797 Rubber heel. A. A. Harris, Randolph, assignor to F. Berenstein, Chelsea—both in Mass.
1,366,849 Inner tube for tires. J. B. Tittle, Jefferson, O.

REISSUES

13,033 Hot-water and ice-bag closure or stopper. J. J. Bowes, Jr., Pensacola, Fla. Original No. 1,292,690, dated January 28, 1919.

THE DOMINION OF CANADA

GRANTED JANUARY 4, 1921

207,066 Elastic fabric. J. G. C. Querin and J. Courbon, coinventors—both of Saint-Etienne (Loire), France.
207,205 Rubber sole for shoes with concave heel-seat. The United Shoe Machinery Co. of Canada, Limited, Maisonneuve, Quebec, Canada, assignee of G. Ferguson, Wollaston, Mass., U. S. A.

GRANTED JANUARY 11, 1921

207,311 Tire filler. R. Ambuhl, Troy, New York, U. S. A.
207,354 Subnormal pressure signal for pneumatic tires. A. G. Ewing, Los Angeles, Calif., U. S. A.
207,361 Tire tread. W. N. Forbes, Dartsmouth, Nova Scotia, Canada.
207,370 Teat cup for milking machines. A. Gillies, Heidelberg, Victoria, Australia.
207,392 Inflatable tube for use in learning to swim. G. Jordhan, Palm Beach, Fla., U. S. A.
207,454 Self-propelling hose nozzle. S. C. Sladden, New York City, U. S. A. (See THE INDIA RUBBER WORLD, September 1, 1919, page 702.)
207,474 Fountain pen filler. J. L. Yuill, Toronto, Ontario, Canada.
207,511 Reservoir to resist damage from perforations of projectiles, sheets of gutta percha and gum-lac forming the protector layer, a light armature of hard rubber and a sheet of vulcanized rubber between two sheets of non-vulcanized rubber forming the flexible wall. The Dunlop Rubber Co., Limited, assignee of Allan Macbeth—both of Paris, France.
207,512 Vehicle wheel. The Dunlop Rubber Co., Limited, Regent's Park, London, assignee of Colin Macbeth, Birmingham, Warwick, and F. J. Keegan, Coventry, Warwick, coinventors—all in England.
207,513 Metal petrol tank for aerial use, covered with layer of raw rubber adapted to dissolve in contact with petrol and automatically close perforation in case of puncture. The Dunlop Rubber Co., Limited, assignee of Allan Macbeth—both of Paris, France.
207,514 Liquid container or tank provided with a non-metallic composite protective covering, the outer part of which is self-displaceable and adapted to cooperate with a soft or plastic inner part to constitute a self-sealing covering for closing any bullet hole made in the tank. The Dunlop Rubber Co., Limited, assignee of J. V. Worthington—both of Westminster, London, England.

Chemical Patents will be found on page 431. Machinery Patents on pages 434-435.

207,515 An imperforate covering for liquid fuel reservoirs for aerial apparatus, comprising sheets of rubber fabric having sheets of sponge rubber interposed therebetween and adapted for the absorption of the liquid fuel upon the perforation of said reservoir. The Dunlop Rubber Co., Limited, assignee of Allan Macbeth—both of Paris, France.
207,526 Tire bead anchorage. The Goodyear Tire & Rubber Co., assignee of C. G. Hoover—both of Akron, Ohio, U. S. A.
207,532 Hose clamp. The Independent Pneumatic Tool Co., Chicago, assignee of A. Leyedahl, Aurora—both in Ill., U. S. A.

GRANTED JANUARY 18, 1921

207,582 Resilient cushion tire. A. Borner, Scheveningen, Holland.
207,583 Demountable rim for tires. W. N. Booth, Detroit, Mich., U. S. A.
207,588 Demountable rim for tires. C. F. Christopher, Asheville, North Carolina, U. S. A.
207,630 Armored tire. A. E. Jennings, Owensboro, Ky., U. S. A.
207,631 Hose coupling. J. P. Johnson, Toronto, Ontario, Canada.
207,636 Spring tire with solid rubber tire surrounding springs. G. C. Lehr, St. Louis, Mo., U. S. A.
207,655 Pneumatic tire. J. W. McElvain, Chicago, Ill., U. S. A.
207,689 Pneumatic tire with sectional metallic casing. J. L. A. Tetrault, Montreal, Quebec, Canada.
207,703 Cushion tire. C. Warwick, Vancouver, B. C., Canada.
207,721 Air-valve hand-hole plate for disk wheel carrying pneumatic tire. The Harvey Rim & Wheel Co., Inc., assignee of L. B. Harvey—both of Buffalo, New York, U. S. A.

GRANTED JANUARY 25, 1921

207,781 Saddle top for cycles. J. Jelly, Coventry, and H. Jelly, Birmingham, coinventors—both in England.
207,831 Hose coupling. H. J. Fitzpatrick, Athens, Ga., U. S. A.
207,858 Ladder safety foot. A. Johnson, Liverpool, Lancaster, England.
207,875 Rubber heel. G. H. Lewis, Elyria, Ohio, U. S. A.
207,889 Football. W. W. Moren, Oldham, Lancaster, England.
207,948 Resilient tubeless tire, having independent air containers of globular form compressed in a series therein and deformed to egg shape. A. H. Young, Oakland, California, U. S. A.
207,993 Cushioned vehicle wheel. S. Johnstone & Co., Inc., assignee of J. E. Thebaud—both of Buffalo, New York, U. S. A.

THE UNITED KINGDOM

PUBLISHED DECEMBER 15, 1920

151,692 Apparatus for molding concrete, using india rubber for surfaces of molds or cores. J. Woolcock and W. J. Stewart, 12 Berkeley street, London.
151,753 Fountain pen. Wyvern Fountain Pen Co., 143 Holborn, London, and G. Davies, Woodboy street, Leicester—both in England.
151,766 Flower holder. J. Levy, 268 Pershore Road, Edgbaston, Birmingham.
151,838 Suspenders. A. Leighton, Midland, Pa., U. S. A.
151,844 Fountain pen. D. Cameron, Waverley Works, Blair street, Edinburgh.
151,878 Resilient cushioned tire. R. Scheu, 21 Besselstrasse, Berlin.
151,914 Driving belt with vulcanized rubber-covered links. F. H. Smith, 15 King street, Baker Street, London; R. H. Brand, Cranbourne Corner, Ascot, Berkshire; and T. G. Leith, Petmathen House, Oyne, Aberdeenshire.
151,978 Pneumatic tire. The Goodyear Tire & Rubber Co., 1144 East Market street, assignee of K. B. Kilborn, 315 Oakland Drive, and W. S. Wolfe, 157 Edgerton Road—all of Akron, Ohio, U. S. A. (Not yet accepted.)
152,014 Waterproof hat cover. J. F. Schweizer-Caillaux, 130 rue de Paris, Vinceanes, Seine, France. (Not yet accepted.)
152,079 Fountain pen. M. D. Davis, 6 Cardinal Mansions, Carlisle Place, Westminster.

PUBLISHED DECEMBER 22, 1920

152,170 Rubber truss pad. A. Moodie, Buckingham House, Finsbury Park, London, and P. Ellis, 7 Princes street, Westminster.
152,223 Cushioned wheel having pneumatic tire enclosed by rim fitted with solid rubber tread and flanged rings attached to yokes having sliding connection with the wheel felloe. C. F. F. Allen, 123 Castlereagh street, Sydney, Australia.

PUBLISHED DECEMBER 30, 1920

152,453 Bath tub hand grip of metal or gutta percha covered with rubber. A. West, Canandaigua, New York, U. S. A.
152,475 Surgical truss with elastic body-belt. A. Moodie, Buckingham House, Finsbury Park, London, and P. Ellis, 7 Princes street, Westminster.
152,502 Spring wheel with pneumatic cushion. H. C. Baquie, 68 Bowen Crescent, North Carlton, near Melbourne, Australia.
152,575 Belt-gearing pulleys for motor-cycles, light motor vehicles, etc., of leather, or rubber with molded ribs. A. J. Postlethwaite, Staffordshire Works, Bell street, West Bromwich.
152,581 Reinforced pneumatic tire. P. Huth, 905 Pacific Building, San Francisco, Calif., U. S. A.
152,589 Game table with pockets at corners and on sides, and having resilient cushions between the pockets. E. Badger, Hill Foot, Breeze Hill, Bootle, Liverpool.
152,599 Automatic balloon valve with flexible gaskets. The Goodyear Tire & Rubber Co., 1144 East Market street, assignee of A. G. Maranville, 103 Russell avenue—both of Akron, Ohio, U. S. A. (Not yet accepted.)
152,600 Gasket of rubber-impregnated fabric for securing a valve to a balloon envelope or other flexible gas-container. The Goodyear Tire & Rubber Co., 1144 East Market street, assignee of A. G. Maranville, 103 Russell avenue—both of Akron, Ohio, U. S. A. (Not yet accepted.)
152,601 Balloon valve having soft vulcanized rubber gaskets. The Goodyear Tire & Rubber Co., 1144 East Market street, assignee of A. G. Maranville, 103 Russell avenue—both of Akron, Ohio, U. S. A. (Not yet accepted.)

PUBLISHED DECEMBER 31, 1920

152,786 Leather soles and heels with inset rubber studs. W. B. Wilson, 141 Westgate, Burnley.

TRADE MARKS

THE UNITED STATES

SERIAL NUMBERS PUBLISHED JANUARY 6, 1921*

NO. 116,000 The word SAMSON—rubber bicycle tires. Mead Cycle Co., Chicago, Ill.
130,608 The word TIREHEAL—tire puncture healing liquid. Mundial Trading Co., Inc., New York City.

SERIAL NUMBERS PUBLISHED JANUARY 14, 1921*

129,571 The word REDSKIN printed in red—inner tubes. Rambler Rubber Corporation, Houston, Texas.
136,467 Representation of a shield bearing picture of a waterfall and the word FALLS—tires, tubes, repair material, etc. The Falls Rubber Co., Cuyahoga Falls, Ohio.
137,550 The word VACUUM in outline letters within a double-bordered oval—leather, fiber, textile, rubber and composition belting. Vacuum Belting Co., Indianapolis, Ind.

SERIAL NUMBERS PUBLISHED JANUARY 21, 1921*

127,728 Representation of a Maltese cross bearing the word KLEINERT, hanging from a scroll bearing the words THE BEST—rubber household aprons, baby pants, diapers, bloomers, bathing-caps, etc. I. B. Kleinert Rubber Co., New York City.

SERIAL NUMBERS PUBLISHED JANUARY 28, 1921*

123,620 The word GEM—rubber erasers. Joseph Dixon Crucible Co., Jersey City, N. J.
126,280 The words SAVAGE-GRIP—tire patches. D. M. Howard, South Shaftsbury, Vt.
130,681 The word MCGRAW between two green seals bearing a monogram—tires and tubes. The McGraw Tire & Rubber Co., East Palestine, Ohio.
130,877 Representation of a shield within two concentric circles, above the word "BALLY"—footwear of cloth and rubberized fabric, rubber heels and soles, etc. Bally Co., Inc., Wilmington, Del., and New York City.
130,934 Representation of a shield bearing the figures 4810—rubber and fabric hose. United States Rubber Co., New Brunswick, N. J.
130,945 Representation of a butterfly bearing within a superimposed rectangle the word PAPILLON—footwear of cloth and rubberized fabric, rubber heels and soles, etc. Bally Co., Inc., Wilmington, Del., and New York City.
131,498 Representation of a tire around a bust of Madison accompanied by the words MADISON TIRES—tires. Madison Tire & Rubber Co., Inc., Buffalo, New York.
131,648 The words CASTLE CORD—tire casings. New Castle Rubber Co., New Castle, Pa.
134,520 A Greek cross painted in red—tire-mounting adhesives and repair compounds, adhesives for uniting rubber, leather, cloth, etc. National Rubber & Specialties Co., Cincinnati, Ohio.
136,586 The word REX—hoof pads. The Federal Rubber Co., Cudahy, Wis.
137,088 Representation of a shoe sole with the word PERFECTRED superimposed thereon—shoes and oxfords of rubber, leather, fabric and combinations of these. National Cloak & Suit Co., New York City.
138,065 Representation of a black disk bearing a shield outlined in white—raincoats. C. B. Shane Co., Chicago, Ill.
138,760 The word TOPAZ—rubber sponges and sponge rubber goods. Featheredge Rubber Co., Inc., Chicago, Ill. (See description elsewhere in this issue.)

GRANTED JANUARY 4, 1921

Under Act of February 20, 1905†

138,578 STEAM CURED and a spray of thistle—dress shields. J. J. Beyerle Mfg. Co., New York City.
138,579 IRENE—dress shields. J. J. Beyerle Mfg. Co., New York City.
138,586 INANPOUT—dress shields. Brooklyn Shield & Rubber Co., Brooklyn, N. Y.
138,606 POWER PLUS—patches and inner tubes. Darling, Miller & Co., New York City.
138,607 STEELAIRE—tires. J. C. Dawson, Lynn, Mass.
138,614 SOXLOX—hose supporters. C. W. Egerton, New York City.
138,619 STAR—massage shower-bath sprays. The Fitzgerald Manufacturing Co., Torrington, Conn.
138,623 MI LADI DAINTI—sanitary belts, aprons, etc. M. S. George, St. Louis, Mo.
138,627 KOHINOOR—rubber belts reinforced with fabric. The B. F. Goodrich Co., New York City.
138,647 A chevron—tires. International India Rubber Corporation, South Bend, Ind.
138,648 A conventional symbol—tires. International India Rubber Corporation, South Bend, Ind.
138,653 "SHIRLASTIC"—dress shields and garters. I. B. Kleinert Rubber Co., New York City.
138,682 BOYS SHOPS—suspenders, garters, arm-bands, etc. New York Boys' Shops, Inc., New York City.
138,684 GORILLA CLINCH—tire patches. E. J. O'Connell, Pittsfield, Mass.
138,705 HEAD OF THE LAKES—arm-bands, garters and suspenders. Slonim Brothers, Duluth, Minn.
138,712 DRESS SAVER SUPREME—dress shields. Jacob Stein, New York City.
138,715 STAR—garters, arm-bands, and children's hose supporters. Sturm & Scheinberg, New York City.
138,744 WILSON'S SLAPATCH—tire repair shoes and patches. The Wilson Rubber Co., Des Moines, Ia.

Under Act of March 19, 1920, Section 1 (b)†

138,757 The words RED RAPPER, the letter R forming the initial of both words—rubber belting. The Combination Rubber Mfg. Co., Bloomfield, N. J.
138,758 The words DOUBLE WEAR—tires. Dryden Rubber Co., Chicago, Ill.
138,760 The word FOSTER—rubber soles and heels. Foster Rubber Co., Kennebunk, Me., and Boston, Mass.

*Notice of opposition must be filed with the Commissioner of Patents, Washington, D. C., within thirty days after this date.

†See THE INDIA RUBBER WORLD, February 1, 1921, page 576, "Two Kinds of Trade Marks Now Being Registered."

GRANTED JANUARY 11, 1921

Under Act of February 20, 1905†

138,771 CHUMS—chewing gum. Automatic Clerk Co., Newark, N. J.
138,808 BECKTON WHITE—lithopone. E. I. du Font de Nemours & Co., Wilmington, Del.
138,809 PICHER—sulphuric acid. The Eagle-Picher Lead Co., Cincinnati, Ohio.
138,812 SECURO—endless or long-length rubber-coated fabric belts. The Farm Equipment Co., Baltimore, Md.
138,853 PATRICK—hose. F. A. Patrick & Co., Duluth, Minn.

Under Act of March 19, 1920, Section 1 (b)†

138,904 The word MONTEREY—rubber hose and packing. The Goodyear Tire & Rubber Co., Akron, Ohio.
138,906 The words HIGH SPEED—rubber and fabric belting. The Gutta Percha & Rubber Manufacturing Co., New York City.
138,927 The words DRI KURE—stationary vulcanizers. Western Vulcanizer Manufacturing Co., Chicago, Ill.

GRANTED JANUARY 18, 1921

Under Act of February 20, 1905†

139,046 Section of hose—rubber-covered hose. Voorhees Rubber Mfg. Co., Jersey City, N. J.

RENEWED

18,788 A cock and human hand surrounded by a band and ribbon—rubber goods. Chas. Macintosh & Co., Limited, Manchester and London, England. Registered January 6, 1891.

GRANTED JANUARY 25, 1921

Under Act of February 20, 1905†

139,178 A castle on a shield within a tire—tires and tubes. New Castle Rubber Co., New Castle, Pa.

RENEWED

19,557 SNAG-PROOF—rubber boots and shoes. Lambertsville Rubber Co., Lambertsville, N. J. Registered May 19, 1891.

THE DOMINION OF CANADA

REGISTERED

27,829 IMPERVO—waterproof sheets and sheeting. E. A. Armstrong Co., Chicago, Ill., U. S. A.
27,831 AXELITE—power transmission belting and brake band linings. Gutta Percha & Rubber, Limited, Toronto, Ont.
27,862 HOOD with an arrow therethrough—rubber boots and shoes, overshoes, and rubber-soled canvas shoes. Hood Rubber Co., Boston, Mass., U. S. A.
27,863 OLD COLONY RUBBER COMPANY, BOSTON, enclosed within a rectangle having notched corners and the letters U. S. A. under the rectangle—rubber boots and shoes. Hood Rubber Co., Boston, Mass., U. S. A.
27,883 EPOK—tires, inner tubes, rubber shoes, hot-water bottles, nipples, and rubber furniture. The Premier Tire & Rubber Co., Limited, Toronto, Ont.

THE UNITED KINGDOM

PUBLISHED NOVEMBER 24, 1920

407,547 The word RUBLETH—rubber soles, heels and tips. Dexter Brothers, Pomeroy House, 28A Basinghall street, London, E. C. 2.

PUBLISHED DECEMBER 1, 1920

400,914 Representation of a partridge standing within a tire, accompanied by the words TRADE MARK—all rubber goods included in Class No. 40. The F. E. Partridge Rubber Co., Limited, 1 Metcalfe street, Guelph, Ontario, Canada; address for service in the United Kingdom care of Abel & Imray, 30 Southampton Buildings, London, W. C. 2.
404,302 The word IBONDA—rubber and gutta percha goods not included in classes other than No. 40. Arnold Goodwin & Son, Limited, 56 Sumner street, London, S. E. 1
407,670 The Word DAINITE—rubber and gutta percha goods not included in classes other than No. 40. Harboro' Rubber Co., Rubber Mills, St. Mary's Road, Market Harborough, Leicestershire.

PUBLISHED DECEMBER 15, 1920

408,824 The words SILENT NIGHT—rubber protectors for boots and shoes. Herbert J. Fussell & Co., Locksbrook Rubber Mills, Locksbrook Road, Lower Weston, Bath.

PUBLISHED DECEMBER 22, 1920

403,279 The word FALCON on a ribbon scroll above representation of a falcon, in turn above a second ribbon scroll bearing the words Adam Limited London—rubber motor cloth. Adam, Limited, Falcon Works, Copperfield Road, Mile End, London, E. 3.
B407,509 The word EUREKA—rubber cushions for billiard and like tables. Burroughes and Watts, Limited, Registered Offices, 19 Soho Square, London, W. 1.

PUBLISHED DECEMBER 29, 1920

404,500 The word USKIDE—rubber and fiber soles for boots and shoes. United States Rubber Co., Little Burnett street, New Brunswick, New Jersey, and 1790 Broadway, New York City, both in U. S. A.; address for service in the United Kingdom care of Haseltine, Lake & Co., 28 Southampton Buildings, London, W. C. 2.
405,912 Representation of an airplane flying above an automobile, beneath the word DEKLA, all against a background formed by a conventionalized tire bearing on its edge the words Motor, Motorcycle and Cycle Accessories—rubber and gutta percha motor, motorcycle, cycle and airplane accessories, not included in classes other than No. 40. Robert Milburne Wright, 176 Franklin Road, King's Norton, Birmingham, Warwickshire.
B407,508 The word VACUUM—rubber cushions for billiard and the like tables. Burroughes & Watts, Limited, Registered Offices, 19 Soho Square, London, W. 1.
407,996 Monogram of the letters P and C—rubber tires. The Kempshall Tyre Co. of Europe, Limited, 97-98 Long Acre, London, W. C. 2.

DESIGNS

THE UNITED STATES

NO. 56,857 Hot-water bottle. Patented January 4, 1921. Term 7 years. J. H. Cadogan, Chicago, Ill.
56,908 Tire tread. Patented January 18, 1921. Term 14 years. E. O. Blekre, Sioux City, Ia.
56,909 Tire tread. Patented January 18, 1921. Term 14 years. E. O. Blekre, Sioux City, Ia.
56,910 Tire tread. Patented January 18, 1921. Term 14 years. E. O. Blekre, Sioux City, Ia.
56,911 Tire. Patented January 18, 1921. Term 3½ years. D. F. Crow, Omaha, Neb.
56,918 Tire tread. Patented January 18, 1921. Term 14 years. R. B. Gillette and R. W. Hutchins, Eau Claire, Wis.
56,921 Tire. Patented January 18, 1921. Term 14 years. W. E. Greer, assignor to Syracuse Rubber Co., Inc.—both of Syracuse, N. Y.
56,933 Rubber heel. Patented January 18, 1921. Term 14 years. L. E. Meyer, Cuyahoga Falls, assignor to The Firestone Tire & Rubber Co., Akron—both in Ohio.
56,934 Tire tread. Patented January 18, 1921. Term 7 years. H. D. Mitchell, Plainfield, N. J., assignor to D. W. Whipple, New York City.
56,967 Garment shield. Patented January 25, 1921. Term 14 years. V. Guinzburg, assignor to I. B. Kleinert Rubber Co.—both of New York City.
56,969 Garter. Patented January 25, 1921. Term 7 years. M. B. Hammond, Bridgeport, Conn.
56,974 Tire tread. Patented January 25, 1921. Term 14 years. H. L. Kenyon, Setauket, N. Y.
56,975 Tire tread. Patented January 25, 1921. Term 14 years. H. L. Kenyon, Setauket, N. Y.

56,908 56,909 56,910 56,911 56,918 56,921 56,934 56,974 56,975 56,976 56,980 56,981

406,794 Representation of a rectangular label bearing the word THE FARTRIDGE beneath representation of a partridge—all rubber goods included in Class No. 40. The F. E. Partridge Rubber Co., Limited, 1 Metcalfe street, Guelph, Ontario, Canada; address for service in the United Kingdom care of Abel & Imray, 30 Southampton Buildings, London, W. C. 2.
B407,567 The numerals 1001—rubber tapping knives and pruning knives. John Yates & Co., Limited, Exchange Works, Aston Manor, Birmingham.
408,086 The word ROTEX—engine packing, rubber hose and tubing. A. Oppenheimer & Co., 38 Finsbury Square, London, E. C. 2.
408,251 The word ROTEX—rubber and gutta percha goods not included in classes other than No. 40. A. Oppenheimer & Co., 38 Finsbury Square, London, E. C. 2.

PUBLISHED DECEMBER 8, 1920

404,236 Representation of a life preserver and the word REVERSO—life-saving jackets. Speeding's, Limited, 14 Whickham street, Monkwearmouth, Sunderland, Durham.
405,065 The word HOLDFAST—baby soothers, nipples, teething rings and pads. A. S. Cartwright, Limited, West Heath Works, Northfield, near Birmingham.
B407,324 The word ANCHOR—regenerated waste rubber and vulcanized oils used in manufactures as substitutes for rubber. The Anchor Chemical Co., Limited, Clayton Lane, Clayton, Manchester.

56,976 Tire tread. Patented January 25, 1921. Term 14 years. H. L. Kenyon, Setauket, N. Y.
56,980 Tire. Patented January 25, 1921. Term 3½ years. E. L. Lawlor, Youngstown, O.
56,981 Tire. Patented January 25, 1921. Term 3½ years. E. L. Lawlor, Youngstown, O.

CONSIDERABLE INTEREST ATTACHES TO THE PUBLISHED REPORTS that warrants have been issued in Cologne, Germany, for the arrest of several chemical and dye experts formerly employed by Friedrich Bayer & Co., Leverkusen, charging them with breach of contract and betrayal of commercial secrets. Two of these chemists, Dr. Joseph Flackslander and Dr. Otto Runge, have entered the United States and are said to have signed contracts with a leading American chemical and dye concern. Dr. Runge is the inventor of the Runge solution process for rubber reclaiming, described in THE INDIA RUBBER WORLD, December 1, 1919, page 141.

Review of the Crude Rubber Market

NEW YORK

DURING THE PAST MONTH the market conditions for crude rubber have been uniformly dull and featureless. Practically no manufacturer's business has appeared in the market, indicating that the factory stocks are ample for the reduced scale on which all are operating.

The delay incident to announcement of the Goodyear refinancing plans had a deterrent effect on dealers who even yet are awaiting its adoption as a basis for confident future operations. Under such circumstances price changes have been few and unimportant and sales still fewer, mostly limited to very small tonnage. Sales having come practically to a full stop, dealers are quietly awaiting the longed-for industrial revival. Prices have probably reached their lowest levels for spot but futures will no doubt decline, as they are out of proportion to spot figures at the present time.

Some trading has been reported from London during the month, with covering of shorts and slight advances of the market there. London reports January 22, 1921, indicated 54,902 tons on hand. Large shipments are arriving in New York and it is claimed that stock in storage here, aside from that in factories, totals 250,000 tons, estimated as sufficient to cover American needs for all of 1921.

Imports during January, 1921, were 14,177 tons of all grades, compared with 21,351 tons for the corresponding month of last year. Arrivals of plantation rubber for January, 1921, were 12,782 at Atlantic ports and 37 tons at Pacific ports, making a total of 12,819 tons.

Spot and future quotations on standard plantations and Brazilian sorts were as follows:

PLANTATIONS. February 5, first latex crêpe, 19½ to 20 cents; February-March, 20 cents; April-June, 22½ to 23 cents; July-December, 26½ to 27 cents.

February 23, first latex crêpe, 20 to 20½ cents; February-March, 20½ cents; April-June, 22 to 23 cents; July-December, 25½ to 26½ cents.

February 5, ribbed smoked sheets, 17½ to 18 cents; February-March, 18 cents; April-June, 20½ to 21 cents; July-December, 25 cents.

February 23, ribbed smoked sheets, 18½ to 19 cents; February-March, 20 cents; April-June, 21½ cents; July-December, 24½ cents.

February 5, No. 1, amber crêpe, 16½ cents.

February 23, No. 1, amber crêpe, 16½ cents.

February 5, No. 1, rolled brown crêpe, 12½ cents.

February 23, No. 1, rolled brown crêpe, 12½ to 13 cents.

SOUTH AMERICAN PARÁS AND CAUCHO. February 5, upriver fine, 17¼ cents; islands fine, 17 cents; upriver coarse, 13¼ cents; islands coarse, 11 cents; Cametá coarse, 11 cents; caucho ball, 12 to 14 cents.

February 23, upriver fine, 17½ to 18 cents; islands fine, 17½ to 18 cents; upriver coarse, 12½ to 13½ cents; islands coarse, 11 cents; Cametá coarse, 11½ to 12 cents; caucho ball, 12½ to 15 cents.

NEW YORK QUOTATIONS

Following are the New York spot quotations, for one year ago, one month ago, and February 23, the current date:

	March 1, 1920	February 1, 1921	February 23, 1921
PLANTATION HEVEA—			
First latex crêpe	$0.47 @	$0.20 @	$0.20 @.20½
Amber crêpe No. 1	.46 @	.17 @	.16¼@.16½
Amber crêpe No. 2	.45 @	.16 @	.15¼@.15½
Amber crêpe No. 3	.44 @	.15 @	.14½@.14½
Amber crêpe No. 4	.43 @	.13 @	.13½@.14
Brown crêpe, thick and thin	.44 @	.15 @	.13 @.13½
Brown crêpe, specky	.41 @	.13 @	.11 @.12
Brown crêpe, rolled	.40 @	.13 @	.12½@.13
Smoked sheet, ribbed, std.	.46 @	.19¼@	.18½@.19
Smoked sheet, plain, std.	.41 @	.18½@	.17½@
Unsmoked sheet, standard	@	.17½@	.16½@
Colombo scrap No. 1	@	.15 @	.12 @
Colombo scrap No. 2	@	.14 @	.10 @
EAST INDIAN—			
Assam crêpe	@	@	@
Assam onions	@	@	@
Penang black scrap	@	*.08 @	@
PONTIANAK—			
Banjermassin	.13 @	.07 @.08	.07 @.08
Palembang	@	.09½@	@
Pressed block	.27 @	.12 @.13	.11¾@.12¼
Sarawak	@	.07 @	.06½@
SOUTH AMERICAN—			
PARAS—			
Upriver, fine	.42 @	.18½@.19½	.17½@.18
Upriver, medium	@	.15 @.16	.15 @
Upriver, coarse	.31½@	.13 @.14	.12½@.13½
Upriver, weak, fine	@	*.14 @	.12 @.13
Islands, fine	.42 @	*.17½@.18	.17½@.18
Islands, medium	@	.13 @	.15 @
Islands, coarse	.20 @	.11 @.11½	.11 @
Cametá, coarse	.21 @	.11 @.11½	.11½@.12
Madeira, fine	@	.21 @.22	.18½@.20
Acre Bolivian, fine	@	.19 @.22	.18 @.18½
Peruvian, fine	@	.17 @.17½	.16 @.17
Tapajos, fine	@	.17 @.17½	.16½@.17
CAUCHO—			
Upper caucho ball	@	.14 @.15	.14½@.15
Lower caucho ball	.32 @	.12½@	.12½@.13
MANICOBAS—			
Ceará negro heads	.36 @	*.12 @	*.13 @
Ceará scrap	.30 @	*.07 @	*.10 @
Manicoba, 30% guarantee	.32 @	.10 @	*.12½@
Mangebeira thin sheet	.30 @	.09 @	*.15 @
CENTRALS—			
Corinto scrap	.29 @	.11 @.12	.12 @
Esmeralda sausage	.29 @	.11 @.12	.12 @
Central scrap	.30 @	.11 @.12	.12 @
Central scrap and strip	.27 @	.09 @.10	.10 @.11
Central wet sheet	.24 @	.04 @.05	.06 @.07
Guayule, 20% guarantee	.27 @	*.20 @	@
Guayule, washed and dried	.38 @	*.28 @	*.26 @
AFRICANS—			
Niger flake, prime	.17½@	.17 @	*.17 @
Benguela, extra No. 1, 28%	@	@	@
Benguela, No. 2, 32½%	@	@	.07 @
Conakry niggers	.36 @	@	@
Congo, prime, black upper	.38 @	.15 @	*.15 @
Congo, prime, red upper	.35 @	.12 @	*.12 @
Kassai, black	.39 @	.15 @	*.15 @
red	@	@	@
Massai sheets and strings	@	@	@
Rio Nunez ball	@	@	@
Rio Nunez sheets, strings	.37 @	@	@
GUTTA PERCHA—			
Gutta Siak	.31 @	.14 @.16	.17 @
Red Macassar	2.65 @	2.25 @2.60	2.10 @3.00
BALATA—			
Block, Ciudad Bolivar	.52 @	.57 @.58	.60 @.61
Colombia	.46 @	.36 @.37	.45 @.46
Panama	.40 @	.24 @.30	.45 @.46
Surinam sheet	.75 @	.67 @.68	.69 @.70
amber	.78 @	.70 @.71	.84 @

*Nominal.

RECLAIMED RUBBER

In the Akron district the outlook for resumption of tire manufacturing is brightening with the approach of spring, by which time the best informed authorities in the tire trade predict an actual shortage of automobile tires and consequent resumption of manufacturing on something like full time. Among the Eastern rubber plants in lines other than tires, the prospects are less advanced. Under this condition and the continued low prices still ruling for plantation Parás the reclaimers with one accord have ceased to function as trade factors and their plants are closed till business again is active in all rubber manufacturing lines.

NEW YORK QUOTATIONS

FEBRUARY 23, 1921

Prices subject to change without notice

STANDARD RECLAIMS:			
Floating	*$0.15	@	$0.18
Friction	* .15	@	.18
Mechanical	* .09	@	.11
Shoe	* .12½	@	.13½
Tires, auto	* .12	@	.13½
truck	* .09	@	.11
White	* .15	@	.18

*Nominal.

COMPARATIVE HIGH AND LOW NEW YORK SPOT RUBBER PRICES

	February 1921*	February 1920	February 1919
PLANTATIONS			
First latex crêpe	$0.20 @ $0.19½	$0.51½ @ $0.46¼	$0.58 @ $0.55½
Smoked sheet ribbed	.19 @ .17½	.51½ @ .46	.57½ @ .54
PARAS			
Upriver, fine	.17½ @ .17	.46 @ .42½	.59½ @ .58½
Upriver, coarse	.14 @ .13¼	.34 @ .31½	.35 @ .34
Islands, fine	.17½ @ .17	.44¾ @ .42	.49½ @ .49
Islands, coarse	.11½ @ .11	.21 @ .20½	.22¾ @ .22½
Cametá	.12 @ .11	.23½ @ .21½	.23 @ —

*Figured to February 24, 1921.

SINGAPORE RUBBER MARKET

GUTHRIE & CO., LIMITED, Singapore, report [December 31, 1920]:

There is no change to record in the rubber market. Demand continues small and values show little or no fluctuation. A slightly more active tone was in evidence at the weekly auctions, held yesterday, due to a small amount of covering by certain buyers. No sales of standard fine pale crêpe were effected and only one lot of standard sheet was sold at 30½ cents per pound. Off quality sheet sold from 16 to 30 cents, and off quality crêpe from 17 to 29 cents. Fine brown crêpe was in more demand and advanced slightly on the week. Dark and barky crêpes remained steady. Of 676 tons catalogued, 381 tons were sold.

The following is the course of values:

	In Singapore per pound[1]	Sterling Equivalent per pound in London
Sheet, fine ribbed smoked	30½c @ —	—/10½ @ —
Sheet, good ribbed smoked	16 @ 30c	—/ 6¾ @ —/10¾
Sheet, plain smoked	— @ —	— @ —
Sheet, ribbed unsmoked	— @ —	— @ —
Sheet, plain unsmoked	— @ —	— @ —
Crêpe, fine pale	— @ —	— @ —
Crêpe, good pale	17 @ 29	—/ 7½ @ —/11
Crêpe, fine brown	15½ @ 20½	—/ 7¼ @ —/ 8½
Crêpe, good brown	12½ @ 15	—/ 6¼ @ —/ 7
Crêpe, dark	11½ @ 14½	—/ 6 @ —/ 6¾
Crêpe, bark	9 @ 13	—/ 5¼ @ —/ 6¾

[1]Quoted in Straits Settlements currency, $1 = $0.567 United States currency.

AMSTERDAM RUBBER MARKET

JOOSTEN & JANSSEN, Amsterdam, report, under date of February 11, 1921:

The market remained extremely quiet, there being little business and prices hardly fluctuating. Finally, however, prices suddenly advanced and a fair business resulted in crêpe and sheets, spot and forward deliveries. The market soon quieted down, however, closing at:

Hevea crêpe, Fl. 68. Sheets, Fl. 58 spot.

Hevea crêpe, Fl. 71. Sheets, Fl. 60 April-June.

Hevea crêpe, Fl. 76. Sheets, Fl. 68 July-September.

Hevea crêpe, Fl. 80. Sheets, Fl. 72 October-December.

HAMBURG RUBBER MARKET

EFFEKTIV-ROHGUMMIMAKLER-VEREIN, Hamburg, report, under date of January 22, 1921:

The week ended January 22 was quiet, as consumers held back in the expectation that the mark would rise in value. Limited quantities of Pará, medium, and plantation grades changed hands. Offers of best crêpe are fairly small and holders are firm. The Oriental markets were firm, owing to change in the rupee rate and there were sellers at increased prices only. Arrivals were normal and mostly disposed of so that there was no increase in stocks worth mentioning.

Prices moved between:

	Marks
No. 1 first latex crêpe	29 @ 31
No. 1 ribbed smoked sheets	26 @ 27.50
Smoked sheet, lower grade	23 @ 25
Brown crêpe, clean	22 @ 25
Brown crêpe, slightly barky	18 @ 21
Dark crêpe	17 @ 20
Hard fine Pará	29 @ 33
Caucho ball	19 @ 22
Congo No. 1	19 @ 24
Mozambique No. 1	21 @ 28
Panama and Colombia block Balata	55 @ 85
No. 1 balata sheet	105 @ 125
Jelutong	13 @ 18

ANTWERP RUBBER MARKET

GRISAR & CO., Antwerp, report, under date of January 28, 1921:

Reduced business at prices without notable change. There was rather a marked difference in the prices for sheet as compared with those for crêpe. The closing prices were: Spot, February-March, 1*s*, 1*d*; April-June, 1*s*, 1½*d*; July-December, 1*s*, 3¾*d*, (buyers). Fine Pará, 1*s*. 0¼*d*.

Statistics for the week were as follows: Arrivals, 1,883 tons; sales, 566 tons; stock, 54,902 tons against 21,701 in 1920.

Local sales: 471 kilos red Congo at 5 francs.

Stock on hand this day, about 1,738 tons.

The weakness noted in the futures market last week has become still more marked during the week under review, mainly owing to the drop in the pound sterling.

Closing quotations were: February, 5.95; March, 6.00; April-June, 6.05; July, 6.30; August, 6.35; September, 6.40; October-November, 6.50; December, 6.60.

STRAITS SETTLEMENTS RUBBER EXPORTS

It is reported by official report from Singapore that the exports of rubber from Straits Settlements ports in December last amounted to 10,044 tons, which compares with 7,509 tons in November and 14,244 tons in the corresponding month of 1919. The total exports for the past year amounted to 128,155 tons, as against 145,960 tons in 1919 and 62,376 tons in 1918. Transhipments in December amounted to 1,474 tons, making a total for 1920 of 20,156 tons, against 17,903 tons in 1919 and 4,447 tons in 1918. Appended are the comparative statistics:

	1918	1919	1920
January ...tons	4,302	14,404	13,125
February	2,334	15,661	17,379
March	8,858	20,908	5,931
April	6,584	10,848	9,768
May	13,587	15,845	15,617
June	6,515	5,059	11,663
July	1,978	7,818	10,773
August	1,249	8,933	6,673
September	6,209	10,476	9,791
October	3,260	8,338	9,882
November	2,661	13,426	7,509
December	4,839	14,244	10,044
Totals ...tons	62,376	145,960	128,155

These figures include transhipments of rubber from various places in the neighborhood of the Straits Settlements such as Borneo, Java, Sumatra and the non-Federated Malay States, as well as rubber actually exported from the Colony, but do *not* include rubber exports from the Federated Malay States.

FEDERATED MALAY STATES RUBBER EXPORTS

An official report from Kuala Lumpur gives the exports of rubber from the Federated Malay States in the month of December last as 6,090 tons, compared with 6,650 tons in November and 10,340 tons in the corresponding month in the previous year. The total exports for last year from these States were 101,326 tons, as against 108,393 tons in 1919 and 78,283 tons in 1918. Appended are the comparative statistics:

	1918	1919	1920
January ...tons	7,588	7,163	11,119
February	6,820	10,809	9,781
March	7,709	10,679	9,524
April	7,428	7,664	8,375
May	5,851	7,308	7,627
June	5,161	7,094	9,049
July	5,706	8,640	8,043
August	5,291	10,626	9,140
September	6,588	9,841	7,605
October	5,901	8,381	8,323
November	7,097	9,848	6,650
December	7,085	10,340	6,090
Totals ...tons	78,283	108,393	101,326

NOTE.—The statistics given above correct former statements.

CRUDE RUBBER ARRIVALS AT ATLANTIC AND PACIFIC PORTS AS STATED BY SHIPS' MANIFESTS

PARAS AND CAUCHO AT NEW YORK

	Fine	Medium	Coarse	Caucho	Totals Pounds
JANUARY 23. By the S. S. "Manchurian Prince," from Pará.					
Various					15,680
JANUARY 23. By the S. S. "Manchurian Prince," from Manáos.					
H. A. Astlett & Co.					22,932
JANUARY 28. By the S. S. "Denis," from Pará.					
Poel & Kelly	49,483		22,366	75,680	147,529
General Rubber Co.					6,860
Meyer & Brown, Inc.	284,480				284,480
Paul Bertuch	70,689	5,331	40,477	1,384	117,881
JANUARY 28. By the S. S. "Denis," from Manáos.					
General Rubber Co.					7,056
H. A. Astlett & Co.					1,078
Various					201,684
FEBRUARY 14. By the S. S. "Camcens," from Pará.					
Various					15,776
FEBRUARY 14. By the S. S. "Uberaba," from Pará.					
Poel & Kelly					39,298
Paul Bertuch	23,340	28,452	15,170	13,534	80,496

PARAS AND CAUCHO—Continued

	Fine	Medium	Coarse	Caucho	Totals Pounds
FEBRUARY 14. By the S. S. "Justin," from Manáos.					
General Rubber Co.	.....	.....	.....	.....	53,998
Poel & Kelly	.....	.....	.....	.....	60,074
Meyer & Brown, Inc.	.....	17,920	.....	.....	17,920
Various	.....	.....	.....	.....	20,692
FEBRUARY 14. By the S. S. "Justin," from Pará.					
Poel & Kelly	.....	.....	.....	.....	10,290

PLANTATIONS

(Figured 180 pounds to the bale or case)

	Shipment from:	Shipped to:	Pounds.	Totals.
JANUARY 20. By the S. S. "Kumeric," at New York.				
Hood Rubber Co.	Colombo	Watertown	29,640	
J. H. Rossbach & Bros.	Colombo	New York	28,900	
Y. H. Rayner & Co.	Colombo	New York	54,900	
L. Littlejohn & Co., Inc.	Colombo	New York	56,100	
Various	Colombo	New York	311,640	481,080
JANUARY 23. By the S. S. "Tusuyama Maru," at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	72,000	
W. R. Grace & Co.	Singapore	New York	61,200	
Raw Products Co.	Singapore	New York	90,000	
Thornett & Fehr, Inc.	Singapore	New York	100,800	
Mitsui & Co., Limited	Singapore	New York	60,660	384,660
JANUARY 26. By the S. S. "Santa Malta," at New York				
Baring Bros.	Colombo	New York	100,800	
Meyer & Brown, Inc.	Colombo	New York	112,000	
Charles T. Wilson Co., Inc.	Colombo	New York	11,220	
Various	Colombo	New York	137,860	361,880
JANUARY 27. By the S. S. "Montauk," at New York.				
Various	London	New York	49,860	49,860
JANUARY 27. By the S. S. "Hague Maru," at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	56,100	
Eastern Rubber Co.	Singapore	New York	280,260	
Thornett & Fehr, Inc.	Singapore	New York	196,380	
Fred Stern & Co.	Singapore	New York	33,600	
Various	Singapore	New York	130,740	697,080
JANUARY 30. By the S. S. "Intan," at New York.				
F. R. Henderson & Co.	Batavia	New York	67,500	
New York Oversea Co.	Batavia	New York	79,200	
Fred Stern & Co.	Batavia	New York	112,000	
Meyer & Brown, Inc.	Batavia	New York	156,800	
Thos. A. Desmond & Co.	Soerabaya	New York	58,680	
East Asiatic Co., Inc.	Soerabaya	New York	89,460	
Meyer & Brown, Inc.	Colombo	New York	112,000	
Various	Soerabaya	New York	30,060	
The Goodyear Tire & Rubber Co.	Singapore	Akron	577,800	1,283,500
JANUARY 30. By the S. S. "Katuna," at New York.				
Adolph Hirsch & Co., Inc.	Singapore	New York	44,800	
Rubber Importers' & Dealers' Co.	Singapore	New York	88,560	
William H. Stiles & Co.	Singapore	New York	148,500	
L. Littlejohn & Co., Inc.	Singapore	New York	473,900	
Hood Rubber Co.	Singapore	Watertown	533,242	
Chas. T. Wilson Co., Inc.	Singapore	New York	74,950	
Eastern Rubber Co.	Singapore	New York	47,880	
Poel & Kelly	Singapore	New York	347,040	
American Trading Co.	Singapore	New York	25,740	
E. F. Leland & Co.	Singapore	New York	12,600	
Rogers-Pyatt Shellac Co.	Singapore	New York	171,360	
F. R. Henderson & Co.	Singapore	New York	79,380	
Meyer & Brown, Inc.	Singapore	New York	224,000	
Thornett & Fehr, Inc.	Singapore	New York	45,900	
Aldens' Successors, Inc.	Singapore	New York	2,160	
The Goodyear Tire & Rubber Co.	Singapore	New York	37,800	
Winter, Ross & Co.	Singapore	New York	50,400	
General Rubber Co.	Singapore	New York	616,860	
Firestone Tire & Rubber Co.	Singapore	New York	142,200	
Fred Stern & Co.	Singapore	New York	22,400	
The Fisk Rubber Co.	Colombo	Chicopee Falls	33,600	
Various	Telok Anson	New York	17,100	
Various	Penang	New York	75,600	
Various	Port Dickson	New York	19,260	
Various	Singapore	New York	1,020,800	4,356,032
FEBRUARY 3. By the S. S. "Woonsocket," at New York.				
Winter, Ross & Co.	Singapore	New York	51,020	
F. R. Henderson & Co.	Singapore	New York	156,420	
Raw Products Co.	Singapore	New York	45,000	
Baird Rubber & Trading Co.	Singapore	New York	13,500	
L. Littlejohn & Co., Inc.	Singapore	New York	45,800	
Meyer & Brown, Inc.	Singapore	New York	100,800	
William H. Stiles & Co.	Singapore	New York	106,920	
General Rubber Co.	Singapore	New York	1,634,580	
Various	Singapore	New York	548,680	
Firestone Tire & Rubber Co.	Penang	Akron	100,980	
Various	Penang	New York	97,020	
F. R. Henderson & Co.	Batavia	New York	43,740	
Fred Stern & Co.	Batavia	New York	94,080	
Various	Batavia	New York	45,240	3,083,780

	Shipment from:	Shipped to:	Pounds.	Totals.
FEBRUARY 5. By the S. S. "Urbino," at New York.				
L. Littlejohn & Co., Inc.	Colombo	New York	112,000	
Fred Stern & Co.	Colombo	New York	11,200	
Hood Rubber Co.	Colombo	Watertown	125,000	
Various	Colombo	New York	187,660	435,860
FEBRUARY 6. By the S. S. "Ryndam," at New York.				
Charles T. Wilson Co., Inc.	Rotterdam	New York	11,143	
Various	Rotterdam	New York	15,317	26,460
FEBRUARY 8. By the S. S. "Quillota," at New York.				
G. Amsinck & Co., Inc.	Guayaquil	New York	2,880	
American Trading Co.	Guayaquil	New York	4,140	7,020
FEBRUARY 8. By the S. S. "City of Brisbane," at Boston.				
Various	Colombo	Boston	43,920	43,920
FEBRUARY 9. By the S. S. "Saugerties," at New York.				
Firestone Tire & Rubber Co.	Singapore	Akron	111,934	
Poel & Kelly	Singapore	New York	128,152	
The Goodyear Tire & Rubber Co.	Singapore	Akron	2,407	
The Fisk Rubber Co.	Singapore	Chicopee Falls	44,974	
Baring Brothers	Colombo	New York	280,000	
East Asiatic Co., Inc.	Soerabaya	New York	130,860	
Various	Soerabaya	New York	47,700	
Netherlands Corporation for Oversea Trade.	Batavia	New York	7,920	
Meyer & Brown, Inc.	Colombo	New York	280,000	
Thornett & Fehr, Inc.	Belawan Deli	New York	137,520	
Various	Singapore	New York	440,090	1,611,557
FEBRUARY 9. By the S. S. "City of Brisbane," at New York.				
Meyer & Brown, Inc.	Colombo	New York	593,600	
Baring Brothers	Colombo	New York	592,200	
Aldens' Successors, Inc.	Colombo	New York	9,000	
W. R. Grace & Co.	Colombo	New York	96,120	
L. Littlejohn & Co., Inc.	Colombo	New York	179,600	
Charles T. Wilson Co., Inc.	Singapore	New York	44,800	1,515,320
FEBRUARY 11. By the S. S. "Clan Machrogue," at New York.				
Various	Cochin	New York	128,160	128,160
FEBRUARY 11. By the S. S. "Melville Dollar," at New York.				
Hood Rubber Co.	Singapore	Watertown	112,000	112,000
FEBRUARY 14. By the S. S. "Valacia," at New York.				
Poel & Kelly	London	New York	17,100	17,100
FEBRUARY 14. By the S. S. "West Mingo," at New York.				
Various	Singapore	New York	22,500	22,500
FEBRUARY 14. By the S. S. "Welshman," at New York.				
Various	London	New York	20,340	20,340
FEBRUARY 14. By the S. S. "Muncaster Castle," at New York.				
Hood Rubber Co.	Singapore	Watertown	465,024	
Huth & Co.	Singapore	New York	112,000	
Poel & Kelly	Singapore	New York	655,872	
Fred Stern & Co.	Singapore	New York	38,080	
F. R. Henderson & Co.	Singapore	New York	117,376	
Aldens' Successors, Inc.	Singapore	New York	19,712	
L. Littlejohn & Co., Inc.	Singapore	New York	246,800	
Charles T. Wilson Co., Inc.	Singapore	New York	47,100	
General Rubber Co.	Singapore	New York	84,224	
Pacific Trading Co.	Singapore	New York	672	
Meyer & Brown, Inc.	Singapore	New York	168,000	
Various	Singapore	New York	670,176	2,625,036
FEBRUARY 15. By the S. S. "Nieuw Amsterdam," at New York.				
Various	Rotterdam	New York	70,560	70,560

BALATA

JANUARY 22. By the S. S. "Uranus," at New York.				
Wm. Schall & Co.	Haiti	New York	2,700	2,700
JANUARY 28 By the S. S. "Matura," at New York.				
South & Central America Commercial Co.	Trinidad	New York	1,680	1,680
JANUARY 29. By the S. S. "Tivives," at New York.				
Ultramares Corp.	Cartegena	New York	750	750
JANUARY 30. By the S. S. "Ariade," at New York.				
Wm. Schall & Co.	Cuba	New York	1,200	1,200
FEBRUARY 11. By the S. S. "Mayaro," at New York.				
South & Central America Commercial Co.	Trinidad	New York	4,950	4,950
FEBRUARY 14. By the S. S. "Maracaibo," at New York.				
Various	La Guayra	New York	12,000	12,000

CENTRALS

FEBRUARY 6. By the S. S. "General G. W. Goethals," at New York.				
Various	Cristobal	New York	900	900

JELUTONG

	Shipment from:	Shipped to:	Pounds.	Totals.
JANUARY 30. By the S. S. "Katuna," at New York.				
Various	Singapore	New York	58,800	58,800
FEBRUARY 3. By the S. S. "Harold Dollar," at New York.				
Various	Singapore	New York	69,900	69,900

GUTTA PERCHA

JANUARY 27. By the S. S. "Hague Maru," at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	120,000	120,000

GUTTA SIAK

FEBRUARY 3. By the S. S. "Harold Dollar," at New York.				
F. R. Henderson & Co.	Singapore	New York	63,000	63,000

GUAYULE

FEBRUARY 2. By rail at Eagle Pass, Texas.				
Continental-Mexican Rubber Co.	Mexico	New York	55,000	55,000

AFRICANS

JANUARY 23. By the S. S. "West Caruth," at New York.				
Various	West Africa	New York	35,840	35,840
FEBRUARY 14. By the S. S. "Lake Gazette," at New York.				
Various	Natal	New York	5,520	5,520
FEBRUARY 16. By the S. S. "Asia," at New York.				
Various	Marseilles	New York	609,615	609,615

CUSTOM HOUSE STATISTICS

PORT OF NEW YORK

IMPORTS

	December 1919 Pounds	December 1919 Value	December 1920 Pounds	December 1920 Value
UNMANUFACTURED—*free*:				
Crude rubber:				
From Belgium	603,506	$251,212	13,650	$2,048
France	706,733	191,652	22,469	8,825
Netherlands	1,480,555	731,657	211,832	90,525
England	11,530,204	5,366,150	398,403	98,312
Philippine Islands	.....	.....	41,060	10,150
Canada	6,179	2,510	.....	.....
Honduras	2,209	950	.....	.....
Costa Rica	627	265	.....	.....
Panama	9,153	3,257	130	32
Nicaragua	.....	.....	1,013	152
Mexico	3,230	1,099	.....	.....
Brazil	4,842,438	1,721,916	1,533,355	297,574
Colombia	61,785	26,514	7,518	2,403
Ecuador	80,956	17,771	4,800	1,495
Argentina	32,903	16,855	.....	.....
Peru	485,652	91,489	137,138	28,133
Chile	56,000	28,000	.....	.....
Uruguay	13,892	3,850	96,534	35,866
Venezuela	25,722	14,436	.....	.....
British India	95,340	46,694	253,470	89,677
Straits Settlements	15,187,762	6,166,750	15,460,373	4,938,588
British East Indies	5,548,294	2,311,090	3,067,478	738,292
Dutch East Indies	6,106,336	2,803,892	1,828,966	585,100
British W. Africa	5,530	664	.....	.....
French W. Africa	218,306	30,492	.....	.....
Totals	47,103,312	$19,829,175	23,078,189	$6,927,172
Jelutong (Pontianak):				
From Straits Settlements	1,015,410	$121,247	.....	.....
Dutch East Indies	173,906	18,255	.....	.....
Totals	1,189,316	$139,502	.....	.....
Gutta percha:				
From England	284	$221	.....	.....
Straits Settlements	497,406	82,665	116,441	$29,380
Dutch East Indies	242	335	.....	.....
British W. Africa	2,939	411	.....	.....
Totals	500,871	$83,632	116,441	$29,380
Balata:				
From England	28,913	$24,094	.....	.....
Panama	15,323	6,164	1,872	$600
Haiti	24,354	22,295	.....	.....
Colombia	18,911	7,429	1,495	781
British Guiana	43,799	35,075	.....	.....
Dutch Guiana	15,433	11,909	.....	.....
Venezuela	71,795	49,304	43,850	28,523
Nicaragua	.....	.....	2,995	1,500
Totals	218,528	$156,270	50,212	$31,404
Guayule:				
From Mexico	15,820	$3,638	.....	.....
Totals	15,820	$3,638	.....	.....
Reclaimed and scrap rubber	726,725	$63,683	390,996	$46,765
Totals, unmanufactured	49,754,572	$20,275,900	23,635,838	$7,034,721
Manufactures of rubber and gutta percha	.....	$45,405	.....	$31,005
Rubber substitutes	12,880	2,139	.....	.....
Chicle ..... *dutiable*	300,134	221,407	583,479	352,254

EXPORTS

	December 1919 Pounds	December 1919 Value	December 1920 Pounds	December 1920 Value
MANUFACTURED:				
Automobile tires	.....	$1,986,988	.....	$2,766,003
Inner tubes	.....	.....	.....	243,232
Solid tires	.....	.....	.....	194,826
All other tires	.....	72,717	.....	23,691
Belting	.....	249,436	.....	331,411
Hose	.....	.....	.....	350,913
Packing	.....	.....	.....	127,729
Rubber boots ..... *pairs*	9,898	24,713	4,674	16,852
Rubber shoes ..... *pairs*	644,367	526,127	741,826	819,649
Soles and heels	.....	.....	.....	73,826
Druggists' sundries	.....	60,224	.....	143,433
Other rubber manufactures	.....	351,661	.....	587,641
Totals, manufactured	.....	$3,270,866	.....	$5,679,206
Insulated wire	.....	$425,884	.....	$1,168,329
Fountain pens ..... *number*	19,715	21,087	54,586	64,188
Suspenders and garters	.....	128,628	.....	334,667
Chewing gum	.....	135,305	.....	367,649
Totals	.....	$710,904	.....	$1,934,833
UNMANUFACTURED—*free*:				
Reclaimed and scrap rubber	900	$180	672,869	$48,403

FOREIGN EXPORTS

Crude rubber	75,132	$41,177	343,216	$91,602
Balata	27,179	16,434	52,059	34,807
Guayule	2,206	620	.....	.....
Chicle	.....	.....	4,392	1,899
Rubber substitutes	.....	.....	86,183	9,742
Rubber manufactures	.....	.....	.....	4,344

PORT OF BOSTON

IMPORTS

UNMANUFACTURED—*free*:				
Crude rubber:				
From Straits Settlements	.....	.....	4,600	$1,130
British East Indies	.....	.....	273,400	55,108
Totals	.....	.....	278,000	$56,238
Rubber manufactures, *dutiable*	.....	$5,212	.....	$4,397

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$20,226	.....	.....
Belting	.....	1,993	.....	$21
Hose	.....	.....	.....	3,728
Packing	.....	.....	.....	11
Rubber boots ..... *pairs*	9,888	26,494	3,910	11,357
Rubber shoes ..... *pairs*	138,015	112,444	63,399	70,443
Soles and heels	.....	.....	.....	4,266
Druggists' sundries	.....	2,417	.....	2,042
Other rubber manufactures	.....	69,915	.....	29,074
Totals	.....	$233,489	.....	$120,931
Insulated wire	.....	$20,778	.....	$192
Suspenders and garters	.....	16,357	.....	.....
Rubber scrap and reclaimed	225	40	.....	.....
Fountain pens	43	51	.....	.....

PORT OF NEW ORLEANS

IMPORTS

From Costa Rica	.....	.....	957	$89
Nicaragua	9,282	$2,448	.....	.....
Totals	9,282	$2,448	957	$89

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$8,341	.....	$18,950
Inner tubes	.....	.....	.....	2,783
Solid tires	.....	.....	.....	1,428
All other tires	.....	793	.....	766
Belting	.....	5,284	.....	10,619
Hose	.....	.....	.....	13,262
Packing	.....	.....	.....	571
Rubber boots ..... *pairs*	12	78	7	28
Rubber shoes ..... *pairs*	9,482	8,376	36,667	45,040
Soles and heels	.....	.....	.....	43
Druggists' sundries	.....	898	.....	2,247
Other rubber manufactures	.....	3,777	.....	5,061
Totals	.....	$27,547	.....	$100,798
Insulated wire	.....	$5,043	.....	.....
Fountain pens ..... *number*	108	99	.....	.....
Suspenders	.....	4,273	.....	$3,023
Chewing gum	.....	2,649	.....	1,840
Rubber scrap and reclaimed	45	11	.....	.....

PORT OF SEATTLE

IMPORTS

	December 1919 Pounds	December 1919 Value	December 1920 Pounds	December 1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
From Straits Settlements	1,896,337	$841,077	.....	.....
Dutch East Indies	185,878	72,731	.....	.....
Hongkong	118,650	55,293	.....	.....
Japan	67,200	32,041	.....	.....
Totals	2,268,065	$1,001,142	.....	.....
Rubber scrap and reclaimed	3,805	$114	625	$125
Rubber manufactures	.....	532	.....	30

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$7,158	.....	$4,052
Solid tires	.....	.....	.....	752
All other tires	.....	3,624	.....	.....
Belting	.....	2,447	.....	.....
Hose	.....	.....	.....	314
Packing	.....	.....	.....	235
Rubber boots ....*pairs*	351	1,251	658	2,605
Rubber shoes ....*pairs*	1,375	2,190	454	916
Druggists' sundries	.....	438	.....	67
Other rubber manufactures	.....	3,614	.....	1,455
Totals	.....	$20,722	.....	$10,396
Insulated wire	.....	$538	.....	$924
Fountain pens ....*number*	3,015	1,631	12	24
Suspenders	.....	2,029	.....	464
Chewing gum	.....	.....	.....	45
Rubber scrap and reclaimed	375,825	20,745	11,878	291

FOREIGN EXPORTS

Crude rubber	.....	.....	20,112	$4,517

PORT OF SAN FRANCISCO

IMPORTS

	December 1919 Pounds	December 1919 Value	December 1920 Pounds	December 1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
From Straits Settlements	3,099,672	$1,386,997	89,310	$20,603
Dutch East Indies	1,287,847	468,770	.....	.....
Colombo	.....	.....	3,200	800
Hongkong	50,400	18,144	.....	.....
British India	2,860	2,002	.....	.....
Totals	4,440,779	$1,875,913	92,510	$21,403
Balata	.....	.....	463	$185
Chicle	.....	.....	28,276	15,608
Rubber manufactures	.....	$2,661	.....	119

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$219,076	.....	$67,516
Inner tubes	.....	.....	.....	18,809
Solid tires	.....	.....	.....	10,134
All other tires	.....	6,302	.....	3,181
Belting	.....	43,066	.....	90,067
Hose	.....	.....	.....	19,544
Packing	.....	.....	.....	11,682
Rubber boots ....*pairs*	420	2,088	.....	.....
Rubber shoes ....*pairs*	3,229	3,759	1,368	1,583
Soles and heels	.....	.....	.....	5,404
Druggists' sundries	.....	2,215	.....	2,782
Other rubber manufactures	.....	20,345	.....	7,388
Totals	.....	$296,851	.....	$238,090
Insulated wire	.....	$2,853	.....	$10,274
Fountain pens ....*number*	165	395	111	505
Suspenders	.....	9,251	.....	2,182
Chewing gum	.....	3,692	.....	432
UNMANUFACTURED—*free:*				
Reclaimed and scrap rubber	207,405	$8,357	60,430	$604

EXPORTS OF INDIA RUBBER AND CAUCHO FROM MANOS AND IQUITOS DURING DECEMBER, 1920

Exporters	EUROPE Fine	EUROPE Medium	EUROPE Coarse	EUROPE Caucho	EUROPE Total	NEW YORK Fine	NEW YORK Medium	NEW YORK Coarse	NEW YORK Caucho	NEW YORK Total	Grand Totals
General Rubber Co. of Brazil...*kilos*	25,077	21,623	17,266	48,034	112,000	290,368	29,185	1,351	96	321,000	433,000
Stowell & Co.	27,126	16,971	6,400	26,932	77,429	290,194	16,611	22,901	383	240,089	317,518
Tancredo, Porto & Co.	.....	.....	.....	.....	.....	70,655	2,233	31,588	30,970	135,446	135,446
B. Lévy & Co.	.....	.....	2,520	.....	2,520	45,868	7,013	9,408	2,210	64,499	67,019
Semper & Co.	15,180	785	9,079	16,942	41,986	.....	.....	.....	.....	.....	41,986
Ohliger & Co.	24,110	160	1,709	546	26,525	7,360	.....	.....	.....	7,360	33,885
Companhia Fluvial	1,672	178	26	22,444	24,320	.....	.....	.....	.....	.....	24,320
J. Carneiro da Motta	.....	.....	.....	.....	.....	1,700	.....	.....	.....	1,700	1,700
J. Adonias & Co.	.....	.....	.....	.....	.....	.....	1,116	.....	.....	1,116	1,116
Herminio de Carvalho	.....	.....	.....	.....	.....	160	.....	.....	.....	160	160
Totals from Manáos....*kilos*	93,165	39,717	37,000	114,898	284,780	616,305	56,158	75,248	33,659	771,370	1,056,150
In transit from Iquitos	7,124	1,293	1,208	7,487	17,112	37,582	36,805	9,429	4,293	88,109	105,221
Totals .....*kilos*	100,289	41,010	38,208	122,385	301,892	653,887	92,963	84,677	37,952	859,479	1,161,371

Compiled by Stowell & Co., Manáos, Brazil.

EXPORTS OF INDIA RUBBER AND CAUCHO FROM MANAOS AND IQUITOS DURING THE YEAR 1920

Exporters	EUROPE Fine	EUROPE Medium	EUROPE Coarse	EUROPE Caucho	EUROPE Total	NEW YORK Fine	NEW YORK Medium	NEW YORK Coarse	NEW YORK Caucho	NEW YORK Total	Grand Totals
General Rubber Co. of Brazil..*kilos*	1,164,405	156,182	97,445	87,588	1,505,620	1,940,044	212,987	329,368	579,981	3,062,380	4,568,000
Tancredo, Porto & Co.	1,031,743	73,218	85,859	83,163	1,273,983	483,650	154,147	352,982	752,017	1,742,796	3,016,779
Stowell & Co.	947,146	89,800	98,362	535,241	1,670,549	525,388	137,240	252,609	349,970	1,265,207	2,935,756
Ohliger & Co.	264,430	5,455	24,073	22,716	316,674	333,096	49,732	50,865	321,774	755,467	1,072,141
Adelbert H. Alden, Limited	167,638	6,758	1,121	579	176,096	340	5,041	35,160	14,110	54,651	230,747
B. Lévy & Co.	47,498	6,077	55,764	.....	109,339	74,709	8,765	13,580	9,794	106,848	216,187
Higson & Fall	47,858	3,602	10,628	3,861	65,949	49,143	6,287	5,160	42,720	103,310	169,259
A. Souza	.....	.....	.....	.....	.....	2,914	245	97,616	58,569	159,344	159,344
J. A. Mendes & Co.	71,075	98	.....	.....	71,173	.....	13,692	20,225	50,165	84,082	155,255
Semper & Co.	83,589	6,944	29,546	25,697	145,776	3,345	640	1,080	420	5,485	151,261
Companhia Fluvial	41,849	178	1,166	27,332	70,525	.....	.....	.....	.....	.....	70,525
Moraes Carneiro & Co.	14,436	2,291	2,228	2,198	21,153	32,086	4,798	1,965	.....	38,849	60,002
Amorim Irmãos	20,000	.....	.....	.....	20,000	6,240	8,575	14,608	574	29,997	49,997
J. G. Araujo	17,523	6,311	5,126	10,418	39,378	.....	.....	.....	.....	.....	39,378
Gomes & Co.	32,470	660	750	.....	33,880	.....	.....	.....	.....	.....	33,880
G. Deffner & Co.	.....	.....	.....	.....	.....	9,333	.....	2,245	3,156	14,734	14,734
Essabbá & Lévy	13,100	533	302	.....	13,935	.....	.....	.....	.....	.....	13,935
Various	17,606	438	5,576	477	24,097	9,657	2,232	4,768	46	16,703	40,800
Totals from Manáos.....*kilos*	3,982,366	358,545	417,946	799,270	5,558,127	3,469,945	604,381	1,182,231	2,183,296	7,439,853	12,997,980
In transit from Iquitos	30,538	11,358	9,211	21,480	72,587	272,266	594,008	113,999	332,514	1,312,787	1,385,374
Totals .....*kilos*	4,012,904	369,903	427,157	820,750	5,630,714	3,742,211	1,198,389	1,296,230	2,515,810	8,752,640	14,383,354

Compiled by Stowell & Co., Manáos, Brazil.

RUBBER STATISTICS FOR THE DOMINION OF CANADA

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	November 1919 Pounds	November 1919 Value	November 1920 Pounds	November 1920 Value
UNMANUFACTURED—*free:*				
Rubber, gutta percha, etc.:				
From United Kingdom	779,359	$410,096	4,480	$2,088
United States	197,309	86,237	592,385	125,934
Brazil	28,600	20,413	22,000	7,269
British East Indies:				
Straits Settlements	1,048,723	457,147	528,658	226,966
Other countries	.....	.....	4,497	1,860
Balata	.....	.....	28	51
Totals	2,053,991	$973,893	1,152,048	$364,168
Rubber, recovered	347,521	$59,178	124,509	$22,585
Rubber, powdered, and rubber or gutta percha scrap	364,672	44,468	142,396	10,192
Rubber substitutes	135,236	15,512	170,065	18,977
Totals, unmanufactured	2,901,420	$1,093,051	1,589,018	$415,922
PARTLY MANUFACTURED—				
Hard rubber sheets and rods	12,844	$3,579	95,109	$51,857
Hard rubber tubes	.....	1,666	.....	4,374
Rubber thread, not covered	2,659	3,879	785	1,168
Totals, partly manufactured	15,503	$9,124	95,894	$57,399
MANUFACTURED—				
Belting	.....	$17,277	.....	$24,244
Hose	.....	13,598	.....	17,003
Packing	.....	6,218	.....	6,338
Boots and shoes	.....	36,561	.....	36,313
Clothing, including waterproofed	.....	17,290	.....	22,885
Gloves	.....	998	.....	1,358
Hot water bottles	.....	3,022	.....	2,984
Tires, solid	.....	7,515	.....	10,906
Tires, pneumatic	.....	28,620	.....	236,564
Tires, inner tubes	.....	2,449	.....	28,068
Other manufactures	.....	227,950	.....	191,551
Totals, manufactured	.....	$361,498	.....	$578,214
Totals, rubber imports	2,916,923	$1,463,673	1,684,912	$1,051,535
Insulated wire and cables:				
Wire and cables covered with cotton, linen, silk, rubber, etc	.....	$14,475	.....	$17,641
Copper wire and cables, covered as above	.....	9,779	.....	24,222
Chicle	151,203	$94,767	510	230

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS

	November 1919 Produce of Canada Value	November 1919 Reexports of Foreign Goods Value	November 1920 Produce of Canada Value	November 1920 Reexports of Foreign Goods Value
UNMANUFACTURED—				
Crude and waste rubber	$30,273	$16,373	$2,574	.....
MANUFACTURED—				
Belting	$245	.....	$9,791	.....
Hose	17,295	.....	27,271	.....
Boots and shoes	214,658	$131	206,426	$491
Clothing, including waterproofed	9,488	27	3,808	.....
Tires	907	2,046	8,804	930
Tires, pneumatic	231,367	.....	851,561	.....
Other manufactures	13,625	2,236	54,574	5,370
Totals, manufactured	$577,585	$4,440	$1,162,235	$6,791
Totals, rubber exports	$607,858	$20,813	$1,164,809	$6,791
Insulated wire and cable:				
Copper wire and cable	$956	.....	$88,084	.....
Chicle	37,985	.....	75,106	.....

SINGAPORE RUBBER AND GUTTA EXPORTS, 1918-1919

Declared exports of guttas and Pará rubber from Singapore to the United States in 1918 and 1919 are given below:

Articles	1918 Quantity	1918 Value	1919 Quantity	1919 Value
Gutta, Hongkong.*pounds*	67,469	$14,647	.....	.....
Gutta, Jankar	1,598	9,861	.....	.....
Gutta, jelutong	4,043,625	338,916	15,288,586	$1,824,001
Gutta percha	848,506	173,446	267,903	59,542
Gutta, reboiled	19,661	4,648	.....	.....
Gutta Siak	1,429,397	201,919	2,957,172	364,404
Gutta, all others	12,037	898	427,053	46,768
Rubber, Pará	173,968,167	62,372,809	235,045,720	130,292,358
Totals	180,390,460	$63,117,144	253,986,434	$132,587,073

OFFICIAL INDIA RUBBER STATISTICS FOR THE UNITED STATES

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

	Twelve Months Ended December 31 1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—*free:*				
India rubber:				
From France	2,410,319	$752,579	3,588,662	$1,117,089
Netherlands	2,637,665	1,276,060	8,859,178	3,898,785
Portugal	87,422	24,470	2,188,747	587,881
United Kingdom	60,251,894	28,687,500	75,297,018	34,405,278
Canada	5,320,540	2,530,295	371,334	344,344
Central America	448,827	152,146	200,583	61,800
Mexico	963,242	306,307	900,411	267,860
Brazil	58,845,384	20,828,269	36,981,973	10,533,541
Peru	4,567,002	1,501,854	4,097,701	1,284,589
Other South Am.	2,398,750	1,000,962	2,117,456	669,722
British E. Indies	329,624,236	131,652,143	351,924,439	155,329,837
Dutch E. Indies	61,260,330	24,600,493	72,374,169	31,147,774
Other countries	7,124,810	2,507,035	7,644,465	3,147,273
Totals	535,940,421	$215,820,113	566,546,136	$242,795,773
Balata	1,628,134	$937,038	2,384,114	$1,260,043
Guayule	3,204,224	760,690	1,698,859	345,985
Jelutong (Pontianak)	18,662,702	2,213,964	12,705,923	2,068,501
Gutta percha	6,495,818	1,068,698	7,129,127	1,520,309
Rubber scrap	10,775,225	825,619	12,663,747	909,606
Totals, unmanufactured	576,706,524	$221,626,122	603,127,906	$248,900,217
Chicle (dutiable)	9,445,538	$6,216,987	9,859,788	$6,748,955
India rubber and gutta percha	.....	956,085	.....	1,433,957
India rubber substitutes	392,092	47,966	76,234	13,946

EXPORTS OF DOMESTIC MERCHANDISE

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
MANUFACTURED—				
India rubber:				
Scrap and old	8,292,053	$808,993	10,468,538	$788,097
Reclaimed	5,070,632	839,938	4,924,668	832,873
Belting[1]	.....	.....	6,100,460	3,532,277
Hose[1]	.....	.....		3,340,882
Packing[1]	.....	.....		1,525,242
Boots[1] *pairs*	261,110	714,713	302,852	1,012,099
Shoes[1] *pairs*	5,794,488	4,551,386	10,088,511	9,738,390
Soles and heels[1]	.....	.....	.....	984,235
Tires:				
For automobiles[1]	.....	28,924,659	.....	.....
Casings[1]	.....	.....	.....	43,899,502
Inner tubes[1]	.....	.....	.....	4,813,052
Solid tires[1]	.....	.....	.....	3,331,789
All other tires[1]	.....	1,557,227	.....	1,029,672
Druggists' rubber sundries[1]	.....	1,270,506	.....	1,890,957
Suspenders and garters	.....	2,551,858	.....	4,143,487
Other rubber manufactures[1]	.....	9,097,773	.....	8,717,830
Totals, manufactured	.....	$50,317,053	.....	$89,580,384
Fountain pens *number*	423,906	$409,517	465,300	$518,410
Insulated wire and cables	.....	8,815,212	.....	8,208,539

EXPORTS OF FOREIGN MERCHANDISE

	Twelve Months Ended December 31 1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—				
India rubber	5,111,786	$2,205,629	9,246,725	$2,882,996
Gutta percha	12,655	3,611	14,561	6,862
Guayule	2,210	621	1,716	1,126
Balata	351,477	206,118	782,919	433,096
Jelutong (Pontianak)	163,034	26,873	433,455	71,560
Rubber scrap	1,870	206	60,278	11,129
Totals, unmanufactured	5,643,032	$2,443,058	10,539,654	$3,406,769
MANUFACTURED—				
Gutta percha and India rubber	.....	$39,743	.....	$23,779
India rubber substitutes	375	357	150,607	37,416
Totals, manufactured	.....	$40,100	.....	$61,195

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES

	1919	1919 Value	1920	1920 Value
MANUFACTURED—				
To Alaska:				
Belting, hose and packing	.....	$114,711	.....	$140,927
Boots and shoes *pairs*	76,995	200,344	75,850	233,358
Other rubber goods	.....	50,997	.....	70,144
Totals	.....	$366,052	.....	$444,429
To Hawaii:				
Belting, hose and packing	.....	$119,189	.....	$223,131
Automobile tires	.....	1,135,412	.....	1,306,980
Other tires	.....	38,450	.....	72,186
Other rubber	.....	159,886	.....	212,973
Totals	.....	$1,452,937	.....	$1,815,270
To Forto Rico:				
Belting, hose and packing	.....	$57,212	.....	$120,972
Automobile tires	.....	867,457	.....	1,396,912
Other tires	.....	33,742	.....	85,650
Other rubber goods	.....	196,721	.....	483,427
Totals	.....	$1,155,132	.....	$2,086,961

To Philippine Islands—Treated as foreign commerce.

[1]Details of exports of domestic merchandise by countries for the twelve months ended December 31, will be given in a later issue.

EXPORTS OF INDIA RUBBER MANUFACTURES AND INSULATED WI RE AND CABLE FROM THE UNITED STATES BY COUNTRIES, DURING THE MONTH OF NOVEMBER, 1920

EXPORTED TO—	Belting	Hose	Packing	Boots		Shoes		Soles and Heels	Automobile Tires				Insulated Wire and Cables	Druggists' Rubber Sundries	All Other Manufactures of Rubber	Totals
									Casings	Inner Tubes	Solid Tires	All Others				
	Value	Value	Value	Pairs	Value	Pairs	Value	Value	Value	Value	Value	Value	Value	Value	Value	Value
EUROPE:																
Belgium	$628	$477	$860	.....	.....	17,303	$18,015	.....	$83,433	$14,884	.....	.....	$28,427	$87	$2,773	$149,584
Bulgaria	.....	.....	.....	.....	.....	1,728	2,189	.....	1,525	449	.....	.....	.....	.....	482	4,645
Denmark	1,577	.....	747	.....	.....	16,736	18,167	13,300	16,893	120	.....	.....	4,747	296	3,515	59,362
Finland	3,454	357	1,200	.....	.....	10,550	12,100	.....	13,768	650	.....	2,371	3,090	.....	3,329	40,319
France	9,491	726	1,781	.....	.....	7,587	14,561	.....	171,414	2,261	.....	18,200	13,531	239	59,723	291,927
Germany	1,162	.....	.....	.....	.....	.....	.....	.....	17,212	6,532	.....	20	.....	.....	.....	24,926
Gibraltar	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	49	54
Greece	.....	682	.....	2	$15	2,736	3,207	.....	12,250	916	372	.....	1,738	110	2,572	21,862
Iceland and Faroe Islands	.....	.....	.....	3,312	11,259	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11,259
Italy	2,348	.....	.....	168	238	9,536	9,282	265	148,784	21,785	.....	2,902	7,045	3,236	4,445	200,330
Malta, Gozo and Cyprus Islands	.....	.....	.....	1	5	.....	.....	.....	895	80	.....	.....	.....	.....	.....	980
Netherlands	.....	8,668	.....	.....	.....	1,320	1,228	.....	104,520	19,463	.....	40	18,847	1,761	4,839	159,366
Norway	3,319	10,565	2,050	474	1,945	190,049	180,278	720	77,563	4,923	2,191	1,171	7,859	10,544	5,470	308,598
Poland and Danzig	.....	.....	.....	.....	.....	19,080	19,000	.....	9,362	1,530	.....	.....	15,608	.....	.....	45,500
Portugal	3,269	.....	.....	947	2,044	4,400	2,377	.....	8,102	6,000	213	26	.....	135	51	22,217
Roumania	.....	.....	.....	.....	.....	6,120	7,475	.....	19,805	4,657	4,867	.....	1,864	.....	495	39,163
Russia in Europe	.....	.....	.....	.....	.....	1,104	1,500	.....	.....	.....	.....	.....	.....	.....	.....	1,500
Spain	1,444	.....	3,000	.....	.....	2,979	2,621	.....	100,815	7,243	.....	305	3,854	3,615	17,978	140,875
Sweden	6,091	8,493	537	280	1,115	7,227	7,874	235	22,855	8,109	900	4,879	22,817	2,490	10,565	96,960
Switzerland	.....	.....	.....	.....	.....	4,296	4,064	27	12,960	499	.....	.....	11,645	.....	2,581	31,776
Turkey in Europe	.....	682	.....	.....	.....	42,675	48,147	.....	11,766	6,566	.....	.....	.....	.....	985	68,146
England	4,754	42,868	23,008	264	1,020	22,254	14,317	6,057	249,591	42,116	.....	298	50,391	27,149	106,577	568,146
Scotland	16,175	.....	1,172	72	216	3,528	2,407	.....	4,829	1,679	.....	.....	61	.....	3,362	29,901
Ireland	.....	.....	.....	.....	.....	.....	.....	11,123	.....	.....	.....	.....	.....	.....	2,465	13,588
Yugoslavia, Albania, etc	.....	.....	.....	.....	.....	.....	.....	584	5,456	.....	.....	.....	.....	.....	250	6,290
TOTALS, EUROPE	$53,712	$73,519	$34,355	5,520	$17,857	371,208	$368,809	$32,311	$1,093,798	$150,462	$8,543	$30,212	$191,528	$49,662	$232,506	$2,337,274
NORTH AMERICA:																
Bermuda	.....	$669	$35	41	$128	632	$640	$236	.....	$72	.....	.....	.....	$616	$1,551	$3,947
British Honduras	.....	.....	180	.....	.....	745	1,331	.....	$115	.....	.....	.....	.....	60	12	1,698
Canada	$16,685	10,281	3,840	5,058	17,493	9,530	10,552	133	171,767	18,076	$6,811	$3,406	$26,051	22,097	165,352	472,544
Costa Rica	1,182	203	187	.....	.....	.....	.....	516	593	.....	1,680	4	3,415	108	1,133	9,021
Guatemala	1,237	417	146	.....	.....	1,551	2,217	601	2,779	114	.....	371	181	772	937	9,772
Honduras	599	1,541	158	.....	.....	684	997	115	611	62	.....	.....	2,028	490	1,470	8,071
Nicaragua	1,032	421	268	.....	.....	665	1,000	428	.....	38	297	505	563	64	1,672	6,288
Panama	6	21,142	316	30	91	1,118	1,261	348	5,435	2,418	2,191	422	26,347	1,313	1,832	63,122
Salvador	19	90	470	.....	.....	504	658	3,355	10,413	1,378	4,500	443	734	31	830	22,921
Mexico	79,778	47,996	15,348	1	11	15,660	20,877	3,872	204,487	41,997	10,887	.....	76,212	9,460	51,303	562,228
Miquelon, Langley, etc	.....	.....	.....	38	127	168	120	.....	.....	.....	.....	.....	.....	.....	.....	247
Newfoundland and Labrador	4,263	1,128	21	4,383	16,073	548	548	738	.....	.....	253	750	1,286	1,512	1,435	28,007
Barbados	360	.....	.....	.....	.....	802	1,144	63	2,366	214	.....	67	27	.....	314	4,555
Jamaica	20	792	143	18	75	4,903	6,378	890	4,257	1,010	2,349	507	1,950	54	950	19,375
Trinidad and Tobago	.....	609	259	.....	.....	816	1,011	.....	1,749	504	1,061	.....	1,261	78	169	6,701
Other British West Indies	.....	54	.....	.....	.....	1,279	2,156	58	1,212	132	.....	1,232	2,025	58	1,514	8,421
Cuba	13,532	50,024	40,351	2,305	2,889	367,838	382,243	16,007	312,614	33,867	97,292	5,023	252,200	26,860	85,431	1,318,333
Virgin Islands of United States	.....	1,236	290	.....	.....	857	1,582	12	2,934	331	.....	21	.....	21	22	6,449
Dutch West Indies	.....	438	8	.....	.....	1,649	1,891	121	2,305	207	.....	.....	742	14	61	5,787
French West Indies	212	.....	.....	.....	.....	24	16	.....	2,219	234	1,305	595	64	.....	303	4,948
Haiti	.....	243	.....	.....	.....	222	309	1,005	7,857	918	.....	76	742	3	483	11,636
Dominican Republic	199	3,467	1,832	.....	.....	2,712	4,258	658	22,948	2,751	1,307	142	4,058	921	2,316	44,857
TOTALS, NORTH AMERICA	$119,124	$140,731	$63,852	11,874	$36,887	412,907	$441,189	$29,156	$756,661	$104,323	$129,933	$13,564	$399,886	$64,532	$319,090	$2,618,928
OCEANIA:																
Australia	$68,909	$6,515	$949	36	$90	3,476	$3,570	.....	$113,197	$55,268	$5,500	$1,210	$3,180	$1,294	$25,799	$285,481
New Zealand	4,730	2,124	657	672	2,554	648	606	$2,366	117,661	7,982	19,825	.....	2,671	1,247	5,716	168,139
Other British Oceania	.....	.....	.....	.....	.....	35	177	.....	1,848	210	573	.....	289	.....	18	3,115
French Oceania	185	.....	.....	.....	.....	400	697	.....	.....	97	697	14	197	10	141	2,038
Other Oceania	.....	.....	.....	.....	.....	516	684	.....	975	.....	372	.....	25	.....	.....	2,056
Philippine Islands	35,600	7,503	3,519	144	579	59,723	75,261	7,889	134,339	25,159	20,474	25,152	54,011	3,683	35,035	428,204
TOTALS, OCEANIA	$109,424	$16,142	$5,125	852	$3,223	64,798	$80,995	$10,255	$368,020	$88,716	$47,441	$26,376	$60,373	$6,234	$66,709	$889,033
SOUTH AMERICA:																
Argentina	$29,227	$23,593	$2,502	.....	.....	19,965	$17,796	$1,305	$406,823	$63,925	$2,475	$380	$39,621	$15,843	$101,303	$704,793
Bolivia	902	1,238	45	210	$1,642	.....	.....	.....	1,952	.....	388	.....	6,608	.....	49	12,824
Brazil	13,399	15,097	1,818	10	50	5,133	5,591	26,686	99,976	17,312	3,502	320	127,892	9,670	28,941	350,254
Chile	50,800	14,418	3,574	512	4,004	3,589	4,532	344	12,341	2,327	2,383	415	10,193	2,726	9,941	117,998
Colombia	168	2,576	445	12	36	987	1,045	2,470	18,419	3,043	300	205	16,659	5,079	10,783	61,628
Ecuador	.....	1,031	.....	.....	.....	144	195	.....	8,120	1,322	.....	59	5,601	780	725	17,843
British Guiana	385	231	283	.....	.....	3,488	4,239	.....	2,705	466	370	.....	129	.....	852	9,660
Dutch Guiana	.....	633	22	.....	.....	.....	.....	81	1,905	350	.....	.....	.....	.....	211	3,202
French Guiana	.....	.....	30	.....	.....	48	29	.....	.....	.....	.....	.....	.....	.....	18	77
Paraguay	.....	.....	.....	.....	.....	.....	.....	.....	932	.....	.....	.....	.....	170	.....	1,102
Peru	2,116	2,178	2,825	24	200	523	1,075	137	23,036	2,995	2,429	.....	27,978	793	4,207	69,969
Uruguay	2,444	13,666	1,254	.....	.....	10,940	11,793	5,164	49,367	4,617	284	.....	6,821	5,083	12,424	112,917
Venezuela	402	934	439	.....	.....	86	120	345	26,602	1,955	215	101	2,111	3,605	2,996	39,825
TOTALS, SOUTH AMERICA	$99,843	$76,005	$13,237	768	$5,932	44,903	$46,415	$36,532	$652,178	$98,312	$12,346	$1,480	$243,613	$43,749	$172,450	$1,502,092

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires: Casings Value	Automobile Tires: Inner Tubes Value	Automobile Tires: Solid Tires Value	Automobile Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
ASIA:																
Aden	......	......	......	......	......	......	......	......	$125	......	......	......	......	......	......	$125
China	$4,065	$4,422	$3,485	......	......	1,120	$1,537	......	28,356	$20,244	$50	$99	$62,090	$3,023	$5,758	133,129
Kwantung, leased territory	......	300	......	......	......	......	......	......	......	......	......	......	......	......	......	300
Chosen	......	37	121	......	......	30	38	......	......	......	......	......	......	......	34	230
British India	5,665	6,487	1,398	......	......	2,305	4,022	$3	58,001	8,227	16,730	1,135	45,422	1,699	6,717	155,506
Straits Settlements	1,403	......	......	......	......	2,781	3,014	......	83,316	8,150	1,948	......	815	100	2,943	101,689
Other British East Indies	1,165	258	......	......	......	504	827	48	4,095	611	......	......	......	......	......	7,004
Dutch East Indies	......	739	261	......	......	1,200	1,137	38	216,857	7,384	57,703	3,469	27,401	81	2,083	317,153
French Indo China	5,127	......	......	......	......	......	......	......	......	......	......	......	45	......	......	5,172
Hongkong	......	50	369	......	......	68	149	72	341	54	1,905	......	......	45	1,480	4,465
Japan	4,320	1,537	18,571	2,155	$6,293	12,988	12,947	......	17,815	1,671	5,876	682	1,108	486	9,717	81,023
Persia	......	......	......	......	......	36	52	......	......	......	......	......	......	......	......	52
Siam	414	......	......	......	......	396	173	......	879	......	261	......	......	42	......	1,769
Turkey in Asia	......	13	......	100	203	2,019	2,242	......	1,585	273	98	722	......	......	1,859	6,995
TOTAL, ASIA	$22,159	$13,843	$24,205	2,255	$6,496	23,447	$26,138	$161	$411,370	$46,614	$84,571	$6,107	$136,881	$5,476	$30,591	$814,612
AFRICA:																
Belgian Kongo	......	......	......	......	......	2	$5	......	......	......	......	......	......	......	$15	$20
British West Africa	......	......	......	......	......	37	83	......	$43,559	$7,595	$632	$73	......	......	45	51,987
British South Africa	$32,854	$26,628	$5,630	76	$288	1,532	1,709	$7,642	76,256	11,201	......	358	$1,385	$4,607	16,041	184,599
British East Africa	......	......	......	......	......	......	......	......	20,916	3,666	......	......	......	......	262	24,844
Canary Islands	......	......	......	......	......	......	......	......	1,258	13	800	......	......	......	1,482	3,553
French Africa	......	135	......	......	......	59	135	......	904	200	2,000	350	100	......	......	3,824
Morocco	......	......	......	......	......	......	......	......	5,835	......	......	......	......	......	......	5,835
Portuguese Africa	3,912	......	222	......	......	......	......	......	......	......	......	......	......	......	171	4,305
Egypt	......	131	......	......	......	7	14	......	12,373	117	......	......	132	44	1,940	14,751
TOTALS, AFRICA	$36,766	$26,894	$5,852	76	$288	1,637	$1,946	$7,642	$161,110	$22,792	$3,432	$781	$1,617	$4,651	$19,956	$293,718
GRAND TOTALS	$441,028	$347,134	$146,626	21,345	$70,683	918,900	$965,492	$116,057	$3,443,128	$511,219	$286,266	$78,520	$1,033,898	$174,304	$841,302	$8,455,657

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORY OF UNITED STATES

	Belting, Hose and Packing Value	Boots and Shoes Pairs	Boots and Shoes Value	Tires: Automobile Value	Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
Hawaii	$27,613	......	......	$107,866	$1,390	......	......	$21,593	$158,462
Porto Rico	13,385	......	......	166,757	1,988	......	......	74,015	256,145
TOTALS	$40,998	......	......	$274,623	$3,378	......	......	$95,608	$414,607

Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.

OFFICIAL INDIA RUBBER STATISTICS FOR THE UNITED STATES

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

December	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—*free:*				
India rubber:				
From France	706,733	$191,662	22,469	$8,825
Netherlands	1,480,555	731,657	211,832	90,525
United Kingdom	11,902,804	5,557,579	398,403	98,312
Canada	6,179	2,510	209	209
Central America	21,271	6,920	2,275	373
Mexico	55,179	16,684	....	....
Brazil	4,842,438	1,721,916	1,533,355	297,574
Peru	485,652	91,489	137,138	28,133
Other South Am.	271,258	107,426	112,052	40,564
British E. Indies	26,736,394	11,119,560	19,249,506	5,895,233
Dutch E. Indies	7,871,435	3,466,083	1,828,966	585,100
Other countries	1,063,592	387,846	665,556	269,790
Totals	55,443,490	$23,401,332	24,161,761	$7,314,638
Balata	218,528	$156,270	50,675	$31,589
Guayule	15,820	3,638	....	....
Jelutong (Pontianak)	1,189,316	139,502	....	....
Gutta percha	500,871	83,632	116,441	29,380
Rubber scrap	1,102,706	85,243	468,040	49,985
Totals, unmanufactured	58,470,731	$23,869,617	24,796,917	$7,425,592
Chicle (dutiable)	854,968	$610,161	1,250,881	$692,338
India rubber and gutta percha	....	63,419	....	53,656
India rubber substitutes	12,880	2,139	....	....

EXPORTS OF DOMESTIC MERCHANDISE

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
MANUFACTURED—				
India rubber:				
Scrap and old	1,086,786	$81,451	785,279	$51,380
Reclaimed	456,009	73,821	220,177	32,407
Belting[1]	....		....	491,525
Hose[1]	....	436,016	....	443,610
Packing[1]	....		....	164,613
Boots[1] .... *pairs*	21,778	57,993	10,928	38,799
Shoes[1] .... *pairs*	812,069	669,084	854,372	950,304
Soles and heels[1]	....	....	....	85,918
Tires:				
For automobiles[1]	....	2,763,579	....	....
Casings[1]	....	....	....	3,264,711
Inner tubes[1]	....	....	....	366,468
Solid tires[1]	....	....	....	244,527
All other tires[1]	....	148,057	....	30,945
Druggists' rubber sundries[1]	....	103,772	....	182,898
Suspenders and garters	....	189,885	....	364,406
Other rubber manufactures[1]	....	762,013	....	743,977
Totals, manufactured	....	$5,285,671	....	$7,456,488
Fountain pens.... *number*	29,955	$27,196	56,305	$67,361
Insulated wire and cables	....	499,315	....	1,301,307

EXPORTS OF FOREIGN MERCHANDISE

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—				
India rubber	945,582	$388,795	1,545,903	$316,966
Guayule	2,206	620	....	....
Balata	27,179	16,434	52,059	34,807
Jelutong (Pontianak)	70,819	11,300	....	....
Rubber scrap	900	180	....	....
Totals, unmanufactured	1,046,686	$417,329	1,597,962	$351,773
MANUFACTURED—				
Gutta percha and India rubber	....	$994	....	$6,048
India rubber substitutes	20	71	86,183	9,742
Totals, manufactured	....	1,065	....	15,790

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORIES OF THE UNITED STATES

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
MANUFACTURED—				
To Alaska:				
Belting, hose and packing	....	$3,724	....	$14,326
Boots and shoes... *pairs*	2,432	5,498	2,216	6,241
Other rubber goods	....	2,320	....	1,996
Totals	....	$11,542	....	$22,563
To Hawaii:				
Belting, hose and packing	....	$16,760	....	$25,510
Automobile tires	....	169,075	....	60,325
Other tires	....	1,590	....	1,856
Other rubber	....	21,092	....	15,634
Totals	....	$208,517	....	$103,325
To Porto Rico:				
Belting, hose and packing	....	$3,086	....	$13,045
Automobile tires	....	51,840	....	165,862
Other tires	....	1,172	....	1,026
Other rubber goods	....	13,061	....	85,373
Totals	....	$69,159	....	$265,306

To Philippine Islands treated as foreign commerce.

[1] Details of exports of domestic merchandise by countries during December, 1920, will apear in our April issue.

UNITED KINGDOM RUBBER STATISTICS

IMPORTS

Year Ended December 31

UNMANUFACTURED—	1919		1920	
Crude rubber: From—	Pounds	Value	Pounds	Value
Straits Settlements	67,351,100	£7,107,882	66,516,400	£6,499,413
Federated Malay States	62,862,200	6,628,845	67,151,200	6,860,824
British India	11,301,200	1,240,460	12,286,800	1,308,035
Ceylon and dependencies	33,498,100	3,605,033	47,991,900	4,657,041
Other Dutch possessions in Indian Seas	12,283,200	1,286,691	8,608,600	870,634
Dutch East Indies (except other Dutch possessions in Indian Seas)	13,372,200	1,381,220	17,769,400	1,667,780
Other countries in the East Indies and Pacific not elsewhere specified	2,843,800	309,696	2,607,600	268,840
Brazil	18,121,400	1,997,385	18,354,400	1,793,766
Peru	1,184,200	120,349	216,700	20,261
South and Central America (except Brazil and Peru)	478,200	46,201	386,900	36,482
West Africa:				
French West Africa	63,900	5,538	666,800	58,502
Gold Coast	315,200	29,953	231,100	22,239
Other parts of West Africa	1,821,700	172,040	1,210,100	104,379
East Africa (including Madagascar)	943,600	93,330	1,370,000	128,771
Other countries	1,797,700	187,263	3,000,200	259,161
Totals	228,237,700	£24,211,886	248,368,100	£24,556,128
Waste and reclaimed rubber	4,992,400	135,661	8,401,700	165,905
Totals, unmanufactured	233,230,100	£24,347,547	256,769,800	£24,722,033
Gutta percha and balata	12,408,500	£2,142,354	10,190,000	£1,999,058
*Rubber substitutes	.....	.....	1,026,900	47,722
MANUFACTURED—				
Boots and shoes..*dozen pairs*	170,610	£294,338	280,481	£714,685
Waterproof clothing	.....	15,585	.....	13,174
Insulated wire	.....	7,446	.....	33,054
Submarine cables	.....	38	.....	50
Tires and tubes	.....	2,148,989	.....	5,577,078
Other rubber manufactures	.....	557,640	.....	810,747

EXPORTS

UNMANUFACTURED—				
Waste and reclaimed rubber	106,366	£240,849	152,475	£397,763
*Rubber substitutes	.....	.....	28,703	123,346
MANUFACTURED—				
Boots and shoes..*dozen pairs*	15,167	£34,504	12,979	£27,329
Waterproof clothing	.....	247,702	.....	137,437
Insulated wire	.....	97,487	.....	166,072
Submarine cables	.....	78,070	.....	326,295
Tires and tubes	.....	400,482	.....	417,639
Other rubber manufactures	.....	292,851	.....	330,669

EXPORTS—COLONIAL AND FOREIGN

UNMANUFACTURED—				
Crude rubber:				
To Russia	10,100	£820	11,400	£856
Sweden, Norway and Denmark	376,800	40,951	385,400	23,020
Germany	429,400	42,250	1,011,800	54,351
Belgium	727,400	77,126	196,700	12,378
France	1,971,000	226,305	719,800	44,097
Spain	41,600	5,222	53,900	3,539
Italy	514,900	53,787	270,900	20,169
Austria-Hungary	.....	.....	22,400	1,190
Other European countries	302,000	30,617	267,000	15,800
United States	14,132,000	1,707,452	78,500	9,573
Canada	537,600	74,752	248,000	16,645
Other countries	173,900	22,248	22,300	1,280
Totals, rubber	19,216,700	£2,281,530	3,288,100	£202,898
Waste and reclaimed rubber	87,900	£3,222	.....	.....
Gutta percha and balata	321,300	51,207	32,300	£6,396
MANUFACTURED—				
Boots and shoes..*dozen pairs*	143	£414	1,169	£4,112
Waterproof clothing	.....	34	.....	296
Tires and tubes	.....	1,743	.....	82,192
Other manufactures	.....	3,043	.....	2,785
Totals, manufactured	.....	£5,234	.....	£89,385

*Included in "Other Articles," Class III, T., prior to 1920.

THE MARKET FOR RUBBER SCRAP

NEW YORK

LIKE that for reclaimed rubber, the demand for rubber scrap is and has been for months practically non-existent. Prices are nominal without purchases, because the reclaiming plants have all gone out of business temporarily. Rubber scrap and reclaimed rubbers are absolutely dependent on a revival of rubber goods manufacturing in all lines rather than upon tire production alone.

QUOTATIONS FOR CARLOAD LOTS DELIVERED

Prices subject to change without notice

FEBRUARY 23, 1921

BOOTS AND SHOES:			
Arctic tops	lb.	*$0.075 @	
Boots and shoes	lb.	*.05½ @	.05¾
Trimmed arctics	lb.	*.04¾ @	.05¼
Untrimmed arctics	lb.	*.03¾ @	.04¾
HARD RUBBER:			
Battery jars, black compound	lb.	*.01 @	.01¼
No. 1, bright fracture	lb.	*.23 @	.24
INNER TUBES:			
No. 1	lb.	*.09½ @	.10½
Compounded	lb.	*.05½ @	.06½
Red	lb.	*.05 @	.06
MECHANICALS:			
Black scrap, mixed, No. 1	lb.	*.03½ @	.04
No. 2	lb.	*.02½ @	.02¾
Car springs	lb.	*.03½ @	.04
Heels	lb.	*.03 @	.03½
Horse-shoe pads	lb.	*.03 @	.03½
Hose, air brake	lb.	*.03½ @	.03¾
fire, cotton lined	lb.	*.01½ @	.01¾
garden	lb.	*.01½ @	.01¾
Insulated wire stripping, free from fiber	lb.	*.03½ @	.04
Matting	lb.	*.01¼ @	.01½
Red packing	lb.	*.05½ @	.06
Red scrap, No. 1	lb.	*.09 @	.10
No. 2	lb.	*.06¾ @	.07¼
White scrap, No. 2	lb.	*.08 @	.09
No. 1	lb.	*.10 @	.11
TIRES:			
PNEUMATIC—			
Auto peelings	lb.	*.03¼ @	.04½
Bicycle	lb.	*.02¼ @	.02¾
Standard white auto	lb.	*.02½ @	.03½
Mixed auto	lb.	*.01¼ @	.02¼
Stripped, unguaranteed	lb.	*.01 @	.02½
White, G. & G., M. & W., and U. S.	lb.	*.03 @	.03¾
SOLID—			
Carriage	lb.	*.03 @	.03¼
Irony	lb.	@	
Truck	lb.	*.02¼ @	.02¾

*Nominal.

THE MARKET FOR COTTON AND OTHER FABRICS

NEW YORK

THE SPOT MARKET for middling upland cotton has fluctuated during February from between 14.30 cents on the first of the month to 13.20 cents on the 23rd, mostly downward, however. A leading authority states that staple cottons are depressed to about the lowest point touched thus far. Absence of demand and desire to sell are the controlling features.

EGYPTIAN AND ARIZONA COTTONS. In Egyptians good grade uppers can be bought today for 17 cents and medium Sakellarides is worth about 23 cents. Arizona high grades are offered at 32 cents and can probably be bought at 30 cents.

While it is yet early to say anything regarding the coming crop, unless there is a material advance in prices between now and June, the acreage of staples will be very heavily reduced. It is known already that there will be curtailment in this respect in Egypt and Arizona. Mississippi and the Carolinas will probably lead the Southern States in acreage reduction.

UNITED STATES CRUDE RUBBER IMPORTS FOR 1921 (BY MONTHS)

1921	Plantations	Parás	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Balata	Miscellaneous Gum	Waste	Totals 1921	Totals 1920
January	12,819	1,312	43	3	.....	.....	41	173	1,071	15,462	.....
Totals, 1 month, 1921	12,819	1,312	43	3	.....	.....	41	173	1,071	15,462	.....
Totals, 1 month, 1920	17,799	2,620	821	111	.....	.....	65	634	351	.....	22,401

Compiled by The Rubber Association of America, Inc.

RAINCOAT FABRICS. Raincoat concerns are continuing liquidation of their stocks, which holds the market in essentially the same condition, as reported last month. They have yet to place orders for the season's requirements.

DUCKS AND DRILLS. The demand for hose and belting ducks shows a steady improvement and a better market is expected early in March. Due to duck mills having operated on less than half capacity all winter, no large stocks of duck have accumulated. A normal demand would at once develop a shortage of duck. Present rate of duck consumption is in excess of the rate of current production. There is an excess stock of raw cotton on hand but the same is not true of manufactured goods. Mills decline to make up goods until it becomes known what weights will be wanted.

SHEETINGS. The sheeting market is rather quiet, evincing little interest. Where orders are placed price concessions are usually made. Mills are anxious for business and ready to listen to offers. The outlook is for spasmodic buying. With the big cotton crop in hand and small buying activity, prices are tending to lower levels. Such business as is being placed is confined to small lots for spot shipment. Contracts for later delivery are rare.

TIRE FABRICS. Tire manufacturers are stocked up and are out of the market. The fabric manufacturers are withholding quotations in the absence of demand. It is reported that certain southern tire fabric mills are willing to accept 65 cents per pound on contract for standard 17¼-ounce builder fabric.

NEW YORK QUOTATIONS

FEBRUARY 23, 1921

Prices subject to change without notice

ASBESTOS CLOTH			
Brake lining, 2½ lbs. sq. yd., brass or copper insertion	*lb.*		@
2¼ lbs. sq. yd., brass or copper insertion	*lb.*		@
BURLAPS			
32—7-ounce	100 *yards*	$4.50	@
32—8-ounce		4.65	@
40—7½-ounce		5.00	@
40—8-ounce		5.15	@
40—10-ounce		5.50	@
40—10½-ounce		5.75	@
45—7½-ounce		5.50	@
45—8-ounce		5.75	@
48—10-ounce		9.00	@
DRILLS			
38-inch 2.00-yard	*yard*	.16½	@
40-inch 2.47-yard		.14¼	@
52-inch 1.90-yard		.21½	@
52-inch 1.95-yard		.20½	@
60-inch 1.52-yard		.27	@
DUCK			
CARRIAGE CLOTH			
38-inch 2.00 yard enameling duck	*yard*	.18	@
48-inch 1.74-yard		.21⅞	@
72-inch 16.66-ounce		.46⅞	@
72-inch 17.21-ounce		.48½	@
MECHANICAL			
Hose	*pound*	.32	@
Belting		.32	@
HOLLANDS, 40-INCH			
Acme	*yard*	.24	@
Endurance		.26	@
Penn		.34	@
OSNABURGS			
40-inch 2.35-yard	*yard*		@
40-inch 2.48-yard			@
37½-inch 2.42 yard			@
RAINCOAT FABRICS			
COTTON			
Bombazine 64 x 60	*yard*	.12½	@
60 x 48		.11½	@
Cashmeres, cotton and wool, 36-inch, tan		.75	@
Twills 64 x 72		.20	@
60 x 102		.22	@
Twill, mercerized, 36-inch, blue and black		.29½	@
tan and olive		.27	@
Tweed		.40	@ 1.00
printed		.22½	@
Plaids 60 x 48		.12½	@
56 x 44		.12	@
Repp		.30	@ .35
Prints 60 x 48		.13	@
64 x 60		.14	@
IMPORTED WOOLEN FABRICS SPECIALLY PREPARED FOR RUBBERIZING—PLAIN AND FANCIES			
63-inch, 3¼ to 7½ ounces	*yard*	$0.81	@ $2.22
36-inch, 2¾ to 5 ounces		.63	@ 1.62
IMPORTED PLAID LINING (UNION AND COTTON)			
63-inch, 2 to 4 ounces	*yard*	.71	@ 1.57
36-inch, 2 to 4 ounces		.44	@ .84
SHEETINGS, 40-INCH			
48 x 48, 2.35-yard	*yard*	.12¾	@
48 x 48, 2.50-yard		.12¼	@
48 x 48, 2.85-yard		.11	@
64 x 68, 3.15-yard		.12	@
56 x 60, 3.60-yard		.09¼	@
48 x 44, 3.75-yard		.08¼	@
SILKS			
Canton, 38-inch	*yard*	.29½	@
Schappe, 36-inch		.50	@
STOCKINETTES			
SINGLE THREAD			
3½ Peeler, carded	*pound*		@
4½ Peeler, carded		*.55	@
6½ Peeler, combed		*.85	@
DOUBLE THREAD			
Zero Peeler, carded	*pound*	*.45	@
3½ Peeler, carded		*.52½	@
6½ Peeler, combed			@
TIRE FABRICS			
BUILDING			
17¼-ounce Sakellarides, combed	*pound*		@
17¼-ounce Egyptian, combed			@
17¼-ounce Egyptian, carded			@
17¼-ounce Peeler, combed			@
17¼-ounce Peeler, carded			@

TIRE FABRICS—Continued			
CORD			
15-ounce	Egyptian	*pound*	@
BICYCLE			
8-ounce	American	*pound*	@
10-ounce	American		@
CHAFER			
9¼-ounce	Sea Island	*pound*	@
9¼-ounce	Egyptian, carded		@
9¼-ounce	Peeler, carded		@

*Nominal.

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS

NEW YORK

DURING THE PAST MONTH the market conditions for chemicals and compounding ingredients have been generally quiet in practically all lines. In the rubber trade the demand has been not much more than routine except for litharge and zinc oxide, attributed to some renewal of automobile tire manufacturing activity, which is stated to be operating at about 50 per cent capacity.

ANILINE OIL. The market has been unsettled. Demand rather light. Prices ranging for spot from 23½ to 27 cents per pound.

BARYTES. There has been an oversupply of material. Shipments have not been active and the dullness is reflected in a range of nominal prices.

BENZOL. The demand early in the month was fair and increased somewhat toward the end of the period. Prices were 27 cents for 90 per cent and 30 cents for pure grade.

BLANC FIXE. Practically the same conditions prevail regarding this item as with barytes, with no new developments to be anticipated at present.

BLUE LEAD. Trade has ruled from routine to very quiet. Early in the month the price was 7¼ cents a pound stiffening to 7½ cents at the close.

CARBON BLACK. The demand for carbon black has been small, however, prices are strong with marked upward revision in prospect.

CARBON TETRACHLORIDE. The market has varied from dull to fairly active demand with prices firm at 12 to 12½ cents.

DRY COLORS. A waiting market with prices fixed and steady awaiting industrial developments.

LITHARGE. Improvement in the automobile and tire industries has been reflected in an improved interest in litharge. The demand, however, has not reached normal due to large stocks held over by tire and other rubber goods manufacturers.

LITHOPONE. As in the case of litharge, and governed by the same causes, there has been a marked and increasing demand. Prices early in the month reached the lowest level and are holding there at 7 cents per pound.

SOLVENT NAPHTHA. The market is quiet and below the average at 28 to 34 cents a gallon.

SUBLIMED LEAD. The trade has been slow and steady with prices stable.

SULPHUR. Price reduction took place some weeks ago but buying has not responded in marked degree.

TALC. Increased inquiries, and light demand.

WHITING. Rubber makers are out of the market, although the tone is one of improvement and the outlook favorable for good spring trade.

ZINC OXIDE. The last of January there was a price reduction in zinc oxide, all grades were marked down from ½ to ¾ cents for a period of 90 days. Trade demand began at that time to pick up. Further possible reductions in price are looked for although prices now are stable.

NEW YORK QUOTATIONS

February 23, 1921

Prices subject to change without notice

ACCELERATORS, ORGANIC				
Accelerene (f. o. b. English port)	*lb.*		13*s.* 6*d.*	
Accelemal	*lb.*	$0.65	@	
Adco	*lb.*	.60	@	
Aldehyde ammonia crystals	*lb.*	1.15	@	1.20
Aniline oil	*lb.*	.23½	@	.27
Excellerex	*lb.*	.85	@	
Hexamethylene tetramine (powdered)	*lb.*	1.15	@	1.20
N. C. C.	*lb.*		@	
No. 999	*lb.*	14½	@	
Paraphenylene diamine	*lb.*		@	
Thiocarbanilide	*lb.*	.60	@	.70
Velosan	*lb.*		@	
Vul-Ko-Cene	*lb.*		@	
Virol	*lb.*	.60	@	
ACCELERATORS, INORGANIC				
Lead, dry red (bbls.)	*lb.*	.09¼	@	
sublimed blue (bbls.)	*lb.*	.08¼	@	
sublimed white (bbls.)	*lb.*	.08¼	@	
white, basic carbonate (bbls.)	*lb.*	.08	@	
Lime, flour	*lb.*	.02½	@	.03
Superfine, "Cream of Lime"	*lb.*	.03	@	
Litharge, domestic	*lb.*	.10	@	
imported	*lb.*	*.17	@	
sublimed	*lb.*		@	
Magnesium, carbonate, light	*lb.*	.09½	@	.12
calcined extra light	*lb.*	.55	@	
calcined light	*lb.*	.30	@	
calcined medium light	*lb.*	.20	@	.25
calcined heavy	*lb.*	.06	@	.07
calcined commercial (magnesite)	*lb.*	.05	@	
oxide, extra light	*lb.*	.65	@	
light, technical	*lb.*		@	
light, imported	*lb.*		@	
imported	*lb.*		@	
light, commercial	*lb.*		@	
ACIDS				
Acetic 28 per cent	*cwt.*	2.75	@	3.25
glacial, 99 per cent	*cwt.*	9.00	@	13.58
Cresylic (97% straw color) (bbl.)	*gal.*	.95	@	1.02
(95% dark) (bbl.)	*gal.*	.90	@	.97
Muriatic, 20 degrees	*cwt.*	1.70	@	2.50
Nitric, 36 degrees	*cwt.*	6.28	@	
Sulphuric, 66 degrees	*ton*	19.00	@	21.00
ALKALIES				
Caustic soda, 76% (bbls.)	*lb.*	.04½	@	.05
Soda ash, 58%	*cwt.*	2.10	@	2.25
COLORS				
Black				
Bone, powdered	*lb.*	.06½	@	.14
granulated	*lb.*	.10	@	.15
Carbon black (sacks, factory)	*lb.*	.11	@	.20
pressed	*lb.*	.16	@	
Dipped goods	*lb.*	1.00	@	
Drop	*lb.*	.07½	@	.15
Ivory black	*lb.*	.18	@	.40
Lampblack	*lb.*	.18	@	.45
Oil soluble aniline	*lb.*	1.00	@	
Rubber black	*lb.*		@	
Rubber makers' black	*lb.*	.40	@	
Blue				
Cobalt	*lb.*	.27	@	.30
Dipped goods	*lb.*	1.00	@	
Prussian	*lb.*	.60	@	
Ultramarine	*lb.*	.18	@	.35
Rubber makers' blue	*lb.*	3.50	@	
Brown				
Iron oxide	*lb.*	.03	@	
Sienna, Italian, raw and burnt	*lb.*	.06½	@	.15
Umber, Turkey, raw and burnt	*lb.*	.05	@	.06
Vandyke	*lb.*	.03½	@	
Maroon oxide	*lb.*	.13½	@	
Green				
Chrome, light	*lb.*	.38	@	.42
medium	*lb.*	.42	@	.55
dark	*lb.*	.46	@	.60
commercial	*lb.*	.13½	@	
tile	*lb.*	.08	@	.12
Dipped goods	*lb.*	1.00	@	
Oxide I. R.	*lb.*	.65	@	
Oxide of chromium (casks)	*lb.*	.60	@	
Rubber makers' green	*lb.*	3.50	@	
Red				
Antimony, crimson, sulphuret of (casks)	*lb.*	.45	@	
crimson, "R. M. P."	*lb.*	.55	@	
Antimony, golden sulphuret of (casks)	*lb.*	.29	@	
golden, "R. M. P."	*lb.*	.25	@	
7-A	*lb.*	.42	@	
vermilion sulphuret	*lb.*	.65	@	
red sulphuret	*lb.*	.25	@	
Arsenic, red sulphide	*lb.*	.13	@	
Dipped goods, red	*lb.*	1.25	@	
purple	*lb.*	1.00	@	
orange	*lb.*	1.25	@	
Indian	*lb.*	.13½	@	
Para toner	*lb.*	1.75	@	
Red excelsior	*lb.*		@	
Toluidine toner	*lb.*	3.25	@	3.50
Iron oxide, reduced grades	*lb.*	.06½	@	.12
pure bright	*lb.*	.14½	@	.16½
Spanish neutral	*lb.*	.05¾	@	
Venetian	*lb.*	.02½	@	.06

COLORS—continued

Red				
Oil soluble aniline, red	lb.	$1.75	@	
orange	lb.	1.65	@	
Oximony	lb.	.17½	@	
Vermilion, American	lb.	.25	@	.30
permanent	lb.	.34	@	
English quicksilver	lb.	1.05	@	
Rubber makers' red	lb.	3.50	@	4.00
purple	lb.	2.50	@	3.50
White				
Albalith	lb.	.07	@	.07½
Aluminum bronze, extra brilliant	lb.		@	
extra fine	lb.		@	
Lithopone, Beckton white	lb.	.07	@	.07½
Lithopone	lb.	.07	@	.07½
Ponolith (carloads, factory)	lb.		@	
Rubber-makers' white	lb.		@	
Zinc oxide. American Horse Head brand (factory):		C.L.		L.C.L.
Special	lb.	.09¼	@	.09¾
XX red	lb.	.08¾	@	.09¼
French process, Florence brand (factory):				
White seal	lb.	.13	@	.13¼
Green seal	lb.	.11	@	.11½
Red seal	lb.	.10	@	.10½
White seal, imported	lb.	.12¼	@	.12½
Azo factory:				
ZZZ (lead free)	lb.	.08¾	@	.09¼
ZZ (under 5% leaded)	lb.	.08	@	.08½
Z (8-10% leaded)	lb.	.07⅝	@	.08⅓
Standard AA	lb.	.09	@	
Yellow				
Cadmium, sulphide, yellow, light, orange	lb.		@	
red	lb.		@	
Chrome, light and medium	lb.	.25	@	
Dipped goods	lb.	1.25	@	
Ochre, domestic	lb.	.02½	@	
imported	lb.	.04	@	
Rubber makers' yellow	lb.	2.50	@	3.50
Zinc chromate	lb.	.40	@	.45
Oil soluble aniline	lb.	1.75	@	

COMPOUNDING INGREDIENTS

Aluminum flake (carload)	ton	33.00	@	45.00
hydrate	lb.	.22	@	
silicate	ton	28.00	@	35.00
Ammonium carbonate (powdered)	lb.	.15¾	@	.16
Asbestine (carloads)	ton	20.00	@	35.00
Barium, carbonate, precipitated	ton	85.00	@	
dust	ton	110.00	@	
Barytes, pure white (f. o. b. works)	ton	28.00	@	
off color	ton	20.00	@	
uniform floated	ton	28.00	@	
German "Cream"	ton		@	
Basofor	lb.	.05	@	
Blanc fixe (dry, bbls.)	lb.	.05	@	
Bone ash	lb.	.10	@	
Carrara filler	ton	24.00	@	
Chalk, precipitated, extra light	lb.		@	
heavy	lb.		@	
China, clay, Dixie	ton		@	
Blue Ridge	ton		@	
domestic	ton	10.00	@	12.00
imported	ton	16.00	@	25.00
Cotton linters, clean mill run, f. o. b. factory	lb.	.02½	@	.02¾
Fossil flour (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Diatomite	lb.	.03	@	
Glue, high grade	lb.	.35	@	.45
medium	lb.	.28	@	.33
low grade	lb.	.20	@	.22
Graphite, flake (400-pounds bbl.)	lb.	.10	@	.25
amorphous	lb.	.04	@	.08
Ground glass FF. (bbls.)	lb.		@	
Infusorial earth (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Liquid rubber	lb.		@	
Mica, powdered	lb.	.15	@	
Pumice stone, powdered (bbl.)	lb.	.03	@	.08
Rotten stone, powdered	lb.	.02½	@	.04½
Rubber paste	lb.		@	
Silica, gold bond	ton		@	
silver bond	ton		@	
Soap bark, crushed	lb.	.14½	@	.15
Soapstone, powdered gray (carload)	ton	12.00	@	
Starch, powdered corn	cwt.	2.68	@	
Talc, powdered soapstone	ton	25.00	@	
Terra blanche	ton	25.00	@	
Tripoli flour, air-floated, cream or rose (factory)	ton	35.00	@	
white (factory)	ton	37.00	@	
Tyre-lith	ton	100.00	@	
Whiting, Alba (carloads)	cwt.		@	
Columbia	cwt.		@	
commercial	cwt.	.75	@	1.50
Danish	ton		@	
English cliffstone	cwt.	1.30	@	1.75
gilders	cwt.	1.45	@	1.90
Paris, white, American	cwt.	1.60	@	
Quaker	ton		@	
Super	ton		@	
Wood pulp, imported	lb.		@	
XXX	ton	45.00	@	
X	ton	40.00	@	
Wood flour, American	ton		@	

MINERAL RUBBER

Elâteron (c. l. factory)	ton		@	
(l. c. l. factory)	ton		@	
Gilsonite	ton	70.00	@	
Genasco (c. l. factory)	ton	62.50	@	
(l. c. l. factory)	ton	64.50	@	
Hard hydrocarbon	ton		@	
Soft hydrocarbon	ton		@	
K-X	ton		@	

MINERAL RUBBER—continued

K. M. R.	ton		@	
M. R. X.	ton		@	
Pioneer (c. l. factory)	ton	$55.00	@	
(l. c. l. factory)	ton	60.00	@	
Raven M. R.	ton		@	
Refined Elaterite	ton		@	
318/320 M. P. hydrocarbon (c. l. factory)	ton	50.00	@	55.00
(l. c. l. factory)	ton	57.50	@	
300/310 M. P. hydrocarbon (c. l. factory)	ton	40.00	@	
(l. c. l. factory)	ton	45.00	@	
States "A" (c. l. factory)	ton	55.00	@	
No. 1 (c. l. factory)	ton	45.00	@	
Robertson, M. R. pulverized (c. l. factory)	ton	95.00	@	
M. R pulverized (l. c. l. factory)	ton	97.50	@	
M. R. (c. l. factory)	ton	72.50	@	
M. R (l. c. l. factory)	ton	75.00	@	
Rubrax (factory)	ton	50.00	@	
Sympro, granulated	ton		@	
Walpole rubber flux (factory)	lb.		@	

OILS

Avoilas compound	lb.	.16	@	
Castor, No. 1, U. S. P.	lb.	.12	@	
No. 3, U. S. P.	lb.	.11	@	
Corn	lb.	.10½	@	
Cotton	lb.	.07	@	
Glycerine (98 per cent)	lb.	.23	@	
Linseed, raw (carloads)	gal.	.62	@	
Linseed compound	gal.		@	
Palmoline	lb.	.15	@	
Palm niger	lb.	.09	@	
Palm "Lagos"	lb.	.06½	@	
Palm special	lb.		@	
Peanut	lb.	.12¼	@	
Petrolatum	lb.	.06½	@	
Petrolatum, sticky	lb.		@	
Petroleum grease	lb.		@	
Pine, steam distilled	gal.	1.30	@	1.45
Rapeseed, refined	gal.	1.05	@	
blown	gal.	1.14	@	
Rosin	gal.	.42	@	.59
Synpro	gal		@	
Soya bean	lb	.08¼	@	
Tar	gal.	.36	@	

RESINS AND PITCHES

Balsam, fir	gal.	2.00	@	
Cantella gum	lb.	.50	@	
Cumar resin, hard	lb.	.12	@	.16
soft	lb.	.09	@	.13
Tar, retort	bbl.	14.00	@	15.00
kiln	bbl.	14.00	@	14.50
Pitch, Burgundy	lb.	.05	@	.06
coal tar	lb.	.01½	@	
pine tar	lb.	.03½	@	
ponto	lb.	.12	@	
Rosin, K	280 lbs.	7.50	@	
strained	280 lbs.	7.00	@	
Shellac, fine orange	lb.	1.20	@	

SOLVENTS

Acetone (98.99 per cent drums)	lb.	.13½	@	.14
methyl (drums)	gal.		@	
Benzol (water white, 90%)	gal.	.25	@	.34
Beta-naphthol	lb.	.35	@	
Carbon bisulphide (drums)	lb.	.08	@	
tetrachloride (drums)	lb.	.11½	@	.13
Naphtha, motor gasoline (steel bbls.)	gal.	.28½	@	
73@76 degrees (steel bbls.)	gal.	.36½	@	
70@72 (steel bbls.)	gal.	.34½	@	
68@70 degrees (steel bbls.)	gal.	.33½	@	
V. M. & P. (steel bbls.)	gal.	.25½	@	
solvent	gal.	.28	@	
Toluol, pure	gal.	.30	@	.36
Turpentine, spirits	gal.	.59	@	
wood	gal.	.57	@	
Osmaco reducer	gal.		@	
Xylol, pure	gal.	.45	@	.50½
commercial	gal.	.31	@	.34

SUBSTITUTES

Black	lb.	.09	@	.17
White	lb.	.10	@	.19
Brown	lb.	.13	@	.18
Brown factice	lb.	.08	@	.15
White factice	lb.	.10	@	.16
Paragol, soft and medium (carloads)	cwt.	10.81	@	
hard	cwt.	10.81	@	

VULCANIZING INGREDIENTS

Lead, black hyposulphite (Black Hypo)	lb.		@	
Orange mineral, domestic	lb.	.12½	@	
Sulphur chloride (jugs)	lb.	.20	@	
(drums)	lb.	.07½	@	.08
Sulphur, flour, Brooklyn brand (carloads)	cwt.	2.65	@	2.90
Brooklyn brand (l. c. l.)	cwt.	2.35	@	3.15
Bergenport, soft (c. l. factory)	cwt.	2.55	@	
superfine (carloads, factory)	cwt.	2.00	@	2.90

(See also Colors—Antimony.)

WAXES

Wax, beeswax, white	lb.	.67	@	
ceresin, white	lb.	.16	@	
carnauba	lb.	.20	@	
Montan	lb.	.09	@	
ozokerite, black	lb.	.30	@	
green	lb.	.30	@	
paraffine, 115° m. p.	lb.		@	
120° m. p.	lb.		@	
125° m. p.	lb.		@	
130° m. p.	lb.		@	
Phenanthrene	lb.	.08	@	.10
Sweet wax	lb.		@	

*Nominal.

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